Products finishing

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Products Finishing

THE CHROMIUM-HYDROGEN ALLOY

IN time of national emergency the thought strikes home that the vast resources of our land are neither unlimited nor unqualifiably available. An impressive example of this truth is seen in the growing shortages of new drills, taps, reamers, milling cutters, threading hobs and and other essential tools. As these shortages become more acute, the very real necessity is thrust upon us all to conserve the tools which we have by every means within our grasp.

It is a known fact that tool life is greatly increased by proper grinding and by the selection of the best cutting and cooling liquids for the job at hand. It is also a newly recognized fact that everything else being equal, the life of a cutting tool can be extended to from five to seven times its normal life by a 0.0002 to 0.0003 inch thick, electrodeposited layer of "hard" chromium.

Hard chromium differs from ordinary metallic chromium in being a solid solution alloy of chromium and hydrogen. It is common practice to heat tools after plating with this alloy to 300 - 400 degrees F. in order to drive off occluded hydrogen and relieve a condition known as hydrogen embrittlement. But it should be kept in mind that hydrogen still remains in solution in the chromium, and that this alloy does not decompose below temperatures of 525 - 550 degrees F. The presence of dissolved hydrogen is essential to the attainment of desirable physical characteristics.

The chromium-hydrogen alloy is extremely hard, possesses a low coefficient of friction, is unaffected by most chemicals including alkalies and nitric acid, is resistant to wear and corrosion, and is non-magnetic. Its thermal and electrical conductivities are comparable to those of other metals. It also has the advantage of adaptability. Standard plating procedures are available to all who would care to use them, and these procedures are not difficult.

In addition to its use as an effective adjunct to tool life, hard chromium is frequently employed in building up a base metal to dimensional tolerances, where otherwise a forging or casting would have to be scrapped.

Thus it is seen that the plating of our present cutting tools with hard chrome constitutes another powerful weapon with which to help defeat our enemies and hasten the coming of peace. Let us all make full use of this weapon.

Diversification at Buick

Fig. 1—A stream of 20-mm. shells is shown moving toward a Binks automatic paint spraying machine

By B. P. WALKER

Buick standards department gets the "bugs" out of metal finishing through ingenious methods. This central coordinating agency is responsible for solution of production problems.

IT is one thing to have a contract, and another thing to fill it. It is still another thing to have several contracts and fill all of them, but the Buick Motor Division of General Motors Corporation is doing just this.

Every contract entered into by Buick has presented its own unique problems. Most of these problems are being faced by other war plants, but they are unique in that many of them are new to all plants. Many of them are concerned directly with the finishing of metals.

At Buick, as in most General Motors plants, the central coordinating agency for problem solution and the elimination of production "bugs" arising from bonderizing, painting, plating and similar technical chemical processes is the Standards Department. This department may be likened to the cerebral cortex of a human brain, which controls standards and specifications and possesses the

voluminous resources necessary to the proper governing of bodily functions.

Somewhere along the line in any one of the many Buick buildings a production wrinkle may appear suddenly and without warning. Steel parts may start to rust for no apparent reason, a stop-off coating may not hold up properly on the cathode racks of a plating tank, or something may go wrong with a bonderizing job. Whenever a "bug" appears, the Standards Department is notified immediately. Experts from this department are sent to the scene of the trouble. They may have to call in the Laboratory or the Engineering Department or other specialists, but it is their one big job to integrate and unify all findings with the least possible delay and with the most efficient and satisfactory result.

A plan to utilize the helpful ideas and suggestions of all Buick employees for the purpose of increasing war production is in operation at the Buick Motor Division. Employees with ideas for short cuts to increase production or save time or for methods of increasing safety, and so on, drop their ideas in "suggestion" boxes. Worthwhile ideas are adopted and the best ones win prizes of war bonds.

The Plan at Work

One of the most recent of such ideas has been added to a Binks automatic shell spraying machine. The conveyor which carries the shells to the machine is shown in Fig. 1. A steady stream of 20-mm. high explosive projectile bodies passes through this machine to be cleaned, painted, inspected and dried at a rate which is fast, but a military secret. These projectile bodies are capped on one end before being sprayed, in order to protect the interior. One employee thought it would be a good idea if he could eliminate the time consumed in removing the caps, so he rigged up an air jet (shown in Fig. 2) which automatically blows the caps off at the right

Fig. 2—An ingenious device used on the inspection line is an air jet which automatically blows the protective caps off 20-mm. shells after finishing.

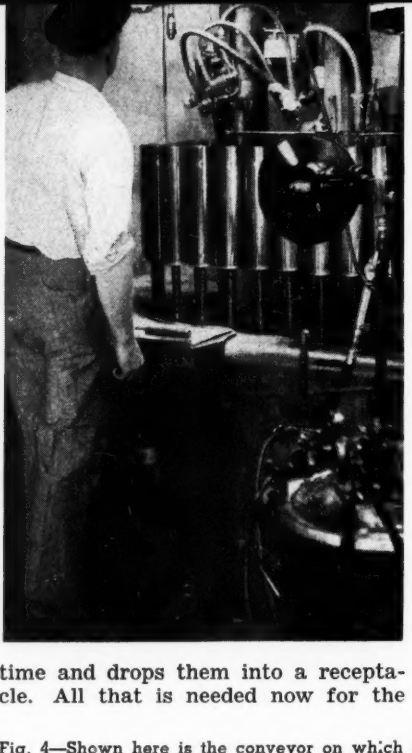
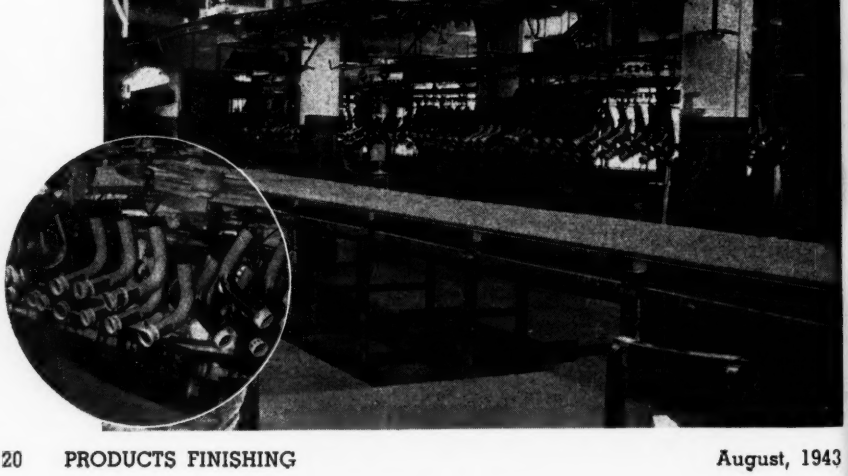


Fig. 3—The inside and outside of each 75-mm. steel cartridge case is painted in a DeVilbiss automatic spray machine, a portion of which is visible here.

time and drops them into a receptacle. All that is needed now for the perfect set-up is for another air jet to blow the caps back on again earlier in the line.

A much larger installation is that for finishing the 75-mm. steel cartridge cases. These cases represent something new in the field of metallurgical engineering. They are made in a way very similar to that in which toothpaste tubes are squeezed out of metal disks the size and shape of a nickel. Only here the starting point is a round steel blank about as big as a good-sized breakfast table biscuit. This is drawn hot to a cup shape and forced through four distinct cold passes, constituting a deep drawing operation the like of which was once considered impossible. The wall of the shell is divided into a series of zones, each of which has its own set of physical properties. Originally the cups were copper plated to a thick-

Fig. 4—Shown here is the conveyor on which air intake pipes for the Pratt & Whitney aircraft motor are moved during painting; Fig. 5 (inset) is a close-up view of the pipes.



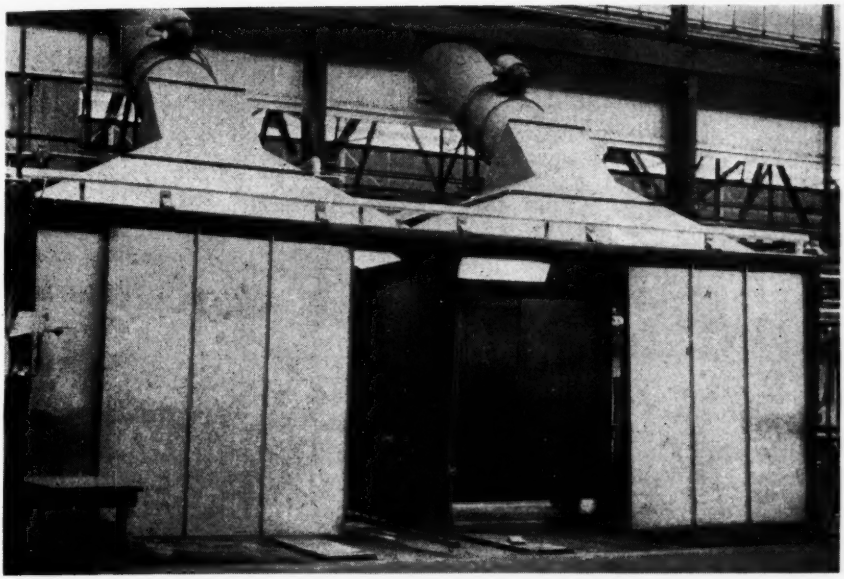
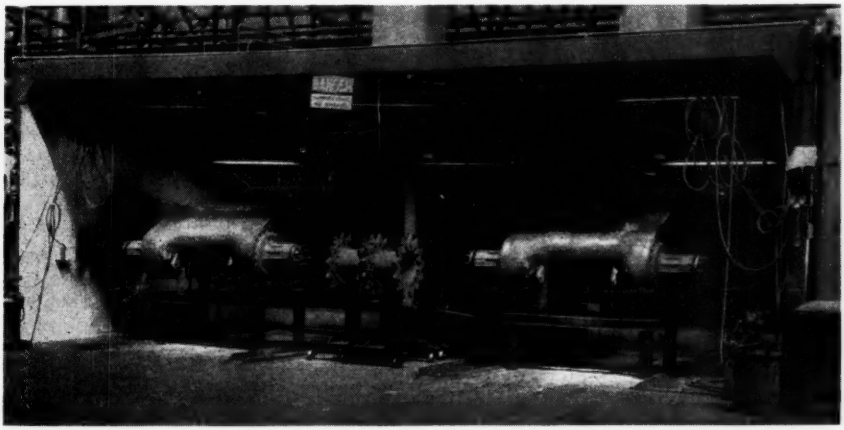


Fig. 6—An extra-large cleaning booth is needed for steam-alkali spray cleaning of the huge castings which house the final drives for the M-4 tanks.

ness of 0.001 inch to facilitate drawing without scratching and to prolong die life. Now they are being bonderized to a phosphate coating which saves copper and actually works better.

Figure 3 shows a portion of the DeVilbiss automatic spray machine in which the inside and outside of each case is painted. As each cartridge is

Fig. 7—Final drive assemblies for the M-4 tanks are spray painted in the booth shown below.



swung into position on the conveyor belt, an automatic spray gun appears from its hiding place, the jet goes on, and the shell is painted. The row of painted cartridges passes under a bank of infra-red lamps which bake them thoroughly.

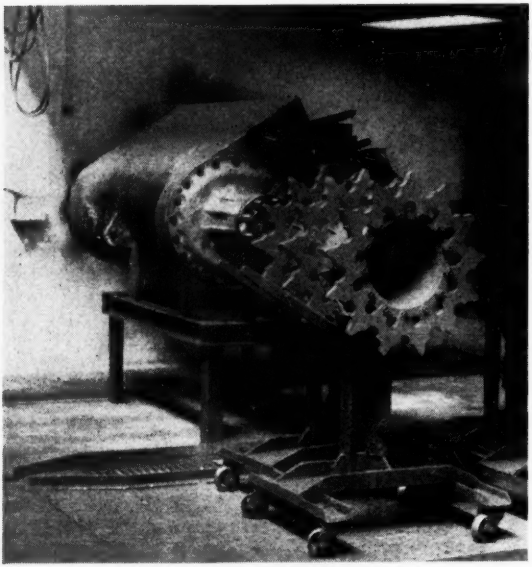


Fig. 8—A close-up view of one of the final drive assemblies is illustrated here.

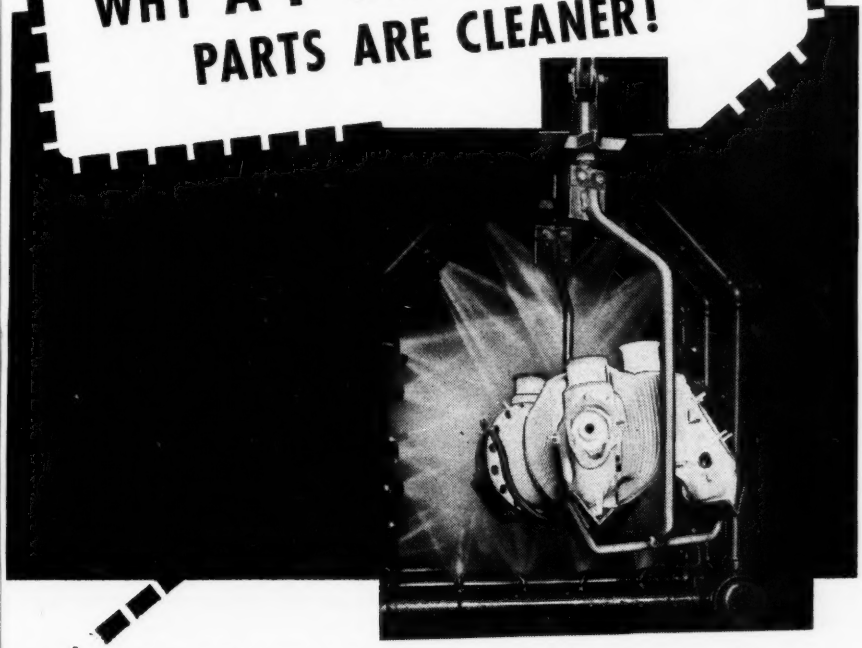
Another interesting problem presented itself in the finishing of the air intake pipes for the Pratt & Whitney aircraft motor. Each of these pipes has a 90-degree bend and two loose packing nuts. The nuts are just loose enough to slide freely over the welded tube, but will not come off. They must not be painted, but the tubes must be. The only possible procedure has seemed to consist of sliding the nuts to one end of the pipe, spraying the other end, drying, sliding the nuts back and spraying the rest of the pipe—thus comprising a two-process job. An end mask is used during each spraying operation to protect the inside of the tube, which is not painted. Figure 4 is a view of the conveyor on which the pipes are transported and Fig. 5 (inset) is a close-up view of the pipes in various stages of painting. The inside receives a phosphate coating whose resistance against rust is increased by fogging in a light rust-prooring oil with a spray gun. The phosphate coating absorbs and retains the oil.

Monsters Cleaned

The huge steel castings which house the final drives for the M-4 tank are over five feet long and weigh over a ton. These monsters are not exactly conducive to easy handling in commercial washing machines; nevertheless, they must be cleaned. They are cleaned at Buick in a special ventilated cleaning booth (Fig. 6) by forced steam and alkali cleaner sprayed through an Oakite gun. The mixing gun used in this operation is the Oakite solution lifting steam gun No. 384, 42 inches long with $\frac{11}{16}$-inch nozzle. The alkali cleaner is power mixed and pumped to an overhead tank, whence it is piped by gravity to the gun. The cleaner is steamed off, and the casting dries rapidly. Figure 7 presents a view of the paint spray booth where final drive assemblies for the M-4 tanks are sprayed; Fig. 8 is a close-up of one of the drive assemblies in the booth.

Other finishing operations include the Du-Lite process on the rocker arms and master rod bolts for the Pratt & Whitney motor and the use of Cowles detergent AE for aluminum, bronze and brass parts, where the main problem is to clean off buffing compounds. Orthosil is used in many spray washers. Both Perm-A-Clor and

WHY A-F MACHINE WASHED PARTS ARE CLEANER!



THIS CLOSE-UP photograph clearly shows the *complete* coverage of high-pressure fan-shaped spray thru which metal products must pass in an A-F Metal Products Cleaning Machine.

In this particular installation a trolley swivel attachment equipped with star wheel turns parts as they pass thru consecutive curtains of spray and exposes all parts to the cleaning solution. The carrier is so designed that cleaning solution and rinse water drain out of all crevices and pockets of parts being cleaned.

While equipment illustrated is part of an A-F machine for speed-washing, rinsing and drying cylinder heads and head and barrel assemblies for one of the leading manufacturers of airplane engines, it is typical of precision engineering built into all A-F Cleaning and Finishing Equipment.

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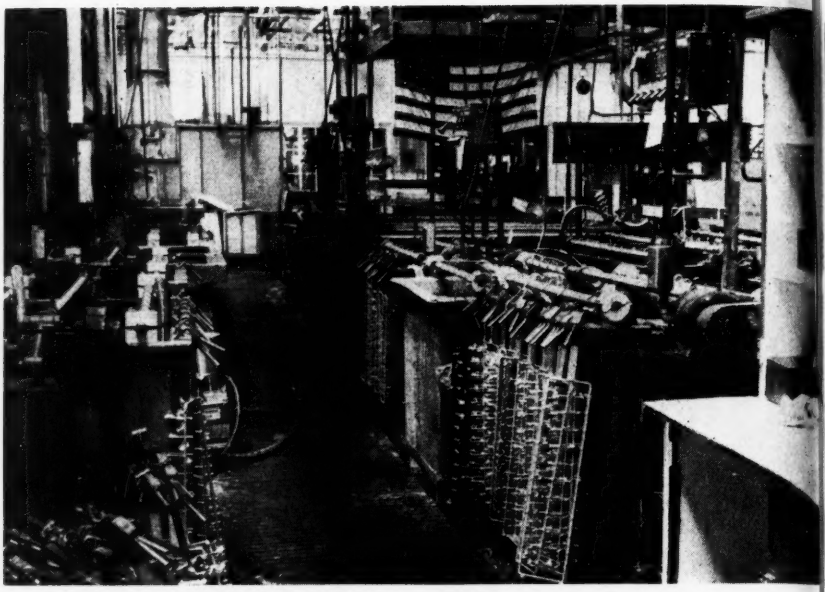

Fig. 9—Silver plating is one of a number of plating operations at Buick; tanks and racks for silver plating are pictured in the above illustration.

Triad are used in degreasing operations. Rusting of steel parts after bonderizing has been reduced by the addition of chromic acid to the second rinse water in a concentration of four ounces per 100 gallons.

Plating operations at Buick include silver, lead, tin, zinc, copper, cadmium and chromium. Silver is plated to a thickness of 0.012 inch on each side of the steel master roll shim of the Pratt & Whitney motor in the tanks illustrated in Fig. 9. A copper flash is put on first. This shim was formerly made of bronze, a material which is conserved

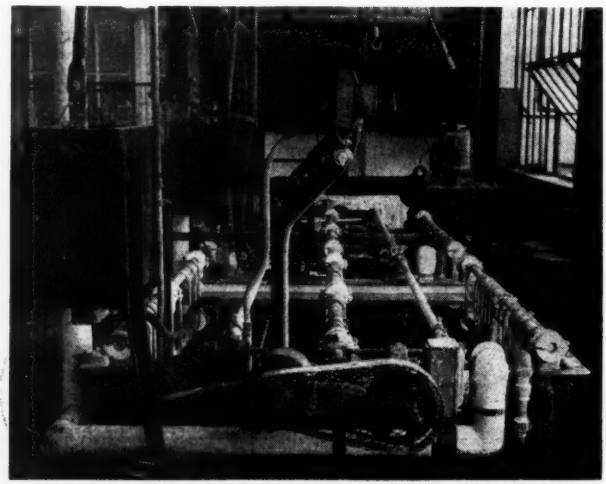

Fig. 10—A section of the cadmium plating tanks at Buick is reproduced in the accompanying illustration.

WORKING TOGETHER . . .

On land . . . on sea . . . and in the air . . . America is learning the lesson of working together. Cooperation of our armed forces is winning the war on the fighting front . . . while teamwork within industry wins our battles of production.

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Stanley Chemical

by the substitution of steel.

In silver plating the Pratt & Whitney motor articulating rod pin, saran plastic is used for masking. Hypo is used as a brightener and has the effect of producing a smoother plate. Plating is done at room temperature with a cathode agitation of 28 feet per minute. Bunatol No. 160 is used as a stop-off coating on the cathode racks. The current density used is 26 amperes per square foot. The best production to date has been 0.0125 to 0.0130 inch in three and one-quarter hours.

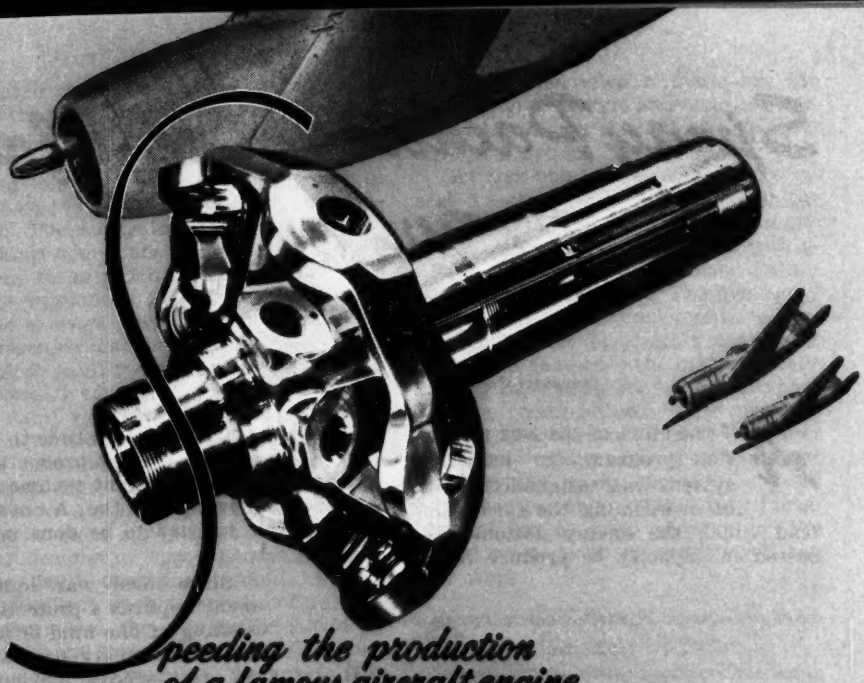
Lead is being plated at Buick on the master rod nut by the acid fluoborate method, using a lead fluoborate concentrate of the Harshaw Chemical Company. The straight sodium stannate bath is used for a tin flash on the accessory drive shaft and propellor shaft. Zinc is plated from the regulation sodium cyanide bath. Copper is plated primarily as a strike for other metals and as a stop-off for carburizing. Udylite's cadmium plating bath is used for all production plating of this metal; a section of the cadmium plating tanks appears in Fig. 10. Some chromium is being plated, primarily for its hardness.

In order to prevent galling and to conserve copper, steel has been substituted for the brass bushings used for the gears on a gun mount part. These bushings are given a manganese-phosphate coating by the Parco-Lubrite process.

It may be said in general that an outstanding characteristic of Buick's war effort is diversification of endeavor accompanied by a unification of all the various factors involved in the scientific approach to problem solving.

Tumbler Saves Time and Material in Metallizing

BY placing small magnet inserts in a wooden rack, George DeSylvester, a metallizer at General Electric's Schenectady Works, could spray aluminum on about 1,000 inserts per day. He suggested that the job could be done faster and better with a tumbler, and when he demonstrated that he could metallize 1,000 inserts in 12 minutes by that method, he was awarded $85 under the company's Suggestion System for submitting the idea. The tumbling method also saves material. About 375 pounds of aluminum were formerly required to spray 60,000 pieces. The same number can now be done with only 10 to 12 pounds.



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A leading automobile manufacturer now making Pratt & Whitney aircraft engines had done a remarkable job of mechanical production . . . and was interested in stepping up the efficiency of the metal cleaning (chemical) operations.

A wide variety of steel and brass engine parts—including the polished steel propeller shaft illustrated—had to be cleaned of mineral cutting oil, black emery, or tallow polishing compound, prior to tin or cadmium plating . . . All work went through a solvent degreasing operation. Electro-cleaning, with two kinds of cleaners, was carried on in two crane operated tanks, with both direct and reverse current. But even with this cycle, cleaning of polishing compound was not complete.

A Penn Salt technical representative was able to do a real job of improving this method. He eliminated the solvent degreaser—and with the same Pennsalt Cleaner in each tank, he used it as both a soak-cleaner and electro-cleaner.

The resulting work was excellent. There were no rejects. The finish was judged to be the brightest ever obtained. Moreover, everybody in the plating room welcomed the elimination of the costly solvent degreasing operation.

What's *your* metal cleaning problem? Whatever the kind of metal or the type of material to be removed, you can benefit by the experienced advice of a Penn Salt technician. Let him tell you what the family of Pennsalt Cleaners is doing throughout industry today to save time, materials and labor. If you prefer, write fully to our Pennsalt Cleaner Division, Dept. PF.

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Spray Painting Need Not Be Wasteful

By JOHN J. ZOLAD
Industrial Coating Engineers, Detroit, Michigan

AT the start of the war production program our industrial system was assigned the task of overcoming the formidable lead which the enemy nations possessed in capacity to produce materials of war. There was no time to be lost in converting to war production and in getting a sufficient volume of equipment flowing to the Armed Forces. The job had to be done in a hurry.

Since most war equipment requires a protective coating of one kind or another, the emergency called for speedy finishing schedules. The answer was ready at hand in the form of highly developed systems of spray painting which were widely adopted in war work. A tremendous volume of war materials was turned out on schedule and, in many cases, ahead of schedule.

Speed in this case, however, was attained at a price because spraying is fundamentally a wasteful method of applying paint. In spraying an ob-

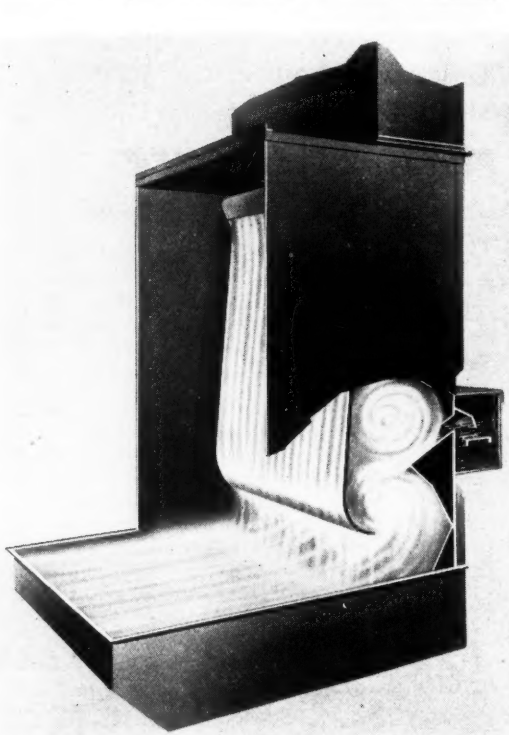

Fig. 1 — This cut-away view of one type of water wash spray booth shows how the water-circulating system operates.
Photograph courtesy Industrial Equipment Corp.

ject, a certain amount of paint is lost in the form of overspray. The amount of paint lost will depend on the size and shape of the object being sprayed and also upon the efficiency with which the spray operation is performed. The spray loss in industrial finishing operations varies from 20 per cent to as much as 80 per cent. In the automobile industry, for example, the average spray loss in finishing a passenger car is about 30 per cent, unless paint recovery and reclamation is practiced.

Paint spraying operations are generally conducted in booths which may be described as enclosures through which high velocity air is drawn to remove atomized paint spray from one or more spray guns. In the earlier designs of spray booths some of the paint overspray would impinge and collect upon the walls of the enclosure and the remainder would be drawn out through ducts into the surrounding atmosphere. Because of the fire and health hazard involved, this type of spray booth has been replaced in many manufacturing plants by the so-called "water wash" booth in which the paint-laden air is drawn successively through a curtain of water and through one or more water sprays.

The illustration Fig. 1 is a cut-away view of one type of water wash spray booth, showing the water-circulating system. Figure 2 presents a large water wash spray booth installation in which cabinets, boxes and similar articles are painted in an up-to-date manufacturing plant.

In addition to materially reducing the fire and health hazards, the modern water wash spray booth aids in recovering the overspray, whereby the substantial waste inherent to spraying operations may be avoided. In the dry method of spraying, the overspray is oxidized by exposure to air. Oxidation converts the material into an inert, insoluble form which cannot be restored to its original condition. In the water type spray booth, the particles of overspray are coated with water and are not exposed to the air long enough for oxidation to set in.

(At this point it may be well to insert a note of caution regarding the inflammability of overspray from the highly pigmented Government specification paints now being used in finishing war equipment. The overspray from highly pigmented paints is porous in nature, making it easier for oxygen to penetrate the material, thus greatly increasing the hazard of spontaneous combustion. Governmental agencies have recognized this danger and have generally specified that water wash spray booths be used wherever possible. This safety measure has led to wide adoption of the water wash type of spray booth on war work.)

Reclamation of Paint

The monetary saving realized by reclamation has paid for many expensive spray booth setups. The extra cost of the water wash spray booth is usually amortized in a relatively short period, leaving the consumer in possession of modern equipment which pays regular dividends in the form of reduced finishing costs.

Under prevailing conditions of scarcity of critical paint ingredients, the importance of monetary savings is overshadowed by the necessity of saving materials. It is a regrettable fact that the potentialities of the water wash spray booth have not been as fully realized on war work as they were in prewar civilian operations. The possibilities of conserving materials by reclamation of the overspray have in many instances been overlooked in the preoccupation with problems of conversion and production of vast quantities of war goods in the shortest possible time. Tremendous quantities of critical paint

ingredients have been wasted (literally thrown away) and the supply of these materials has been depleted to to such an extent as to create a serious shortage. Governmental agencies are making a serious effort to conserve the remaining available supply.

As our mass production industries began converting to war production, the experience gained from reclamation of all types of civilian finishes was brought to bear upon the problem of reclaiming Government specification paints. Experimental work indicated that such large volume items as the olive drab finishes, shell coatings and aircraft finishes could be reclaimed to meet the exacting requirements of the Government specifications. Arrangements for the use of reclaimed paints on war products were made with the appropriate Governmental agencies and more than 150,000 gallons of Government specification paints have been reclaimed. This amount, however, represents but a fraction of the potential saving which can be attained through cooperative action by the paint manufacturing industry and its consumers.

In contrast to the small amount of Government specification paints which has been reclaimed since the war program got underway, it should be noted that more than three million gallons of civilian paints were reclaimed in the few years immediately preceding the war. In other words, we are more wasteful now than we were when there were no shortages.

Conservation of Critical Materials

Every drum of reclaimable paint overspray that is discarded represents a loss of vitally needed critical materials which have not served the purpose for which they were intended. National necessity imposes an obligation upon every paint consumer to eliminate preventable waste of this kind. Now that the planning and organization stage is past, it is high time that some attention be given to saving of these materials which are needed for continued production.

The Salvage Division of the War Production Board has made a survey to determine the quantities of critical paint ingredients which can be salvaged if overspray is reclaimed wherever it is possible to do so. An analysis of the reports from industrial concerns using Government specification coatings on war products shows that the following quantities of critical paint ingredients can be conserved during 1943 by reclamation of overspray:

	Pounds
Pigments	32,398,000
Glycerine	3,526,000
Phthalic Anhydride	4,763,000
Vegetable Oils	6,740,000
Phenol Formaldehyde Resin	840,000
Imported Natural Gums	245,000
Nitrocellulose	491,000

The supplies of these materials are limited and their use in paints has been restricted, due either to the more urgent needs in other phases of the war effort or to the more urgent requirements of the basic raw materials used in their manufacture. The pigments, for example, contain metals, such as chromium, zinc and iron, which are more urgently needed in the production of steel and alloys. In view of the Government's widely publicized program to enlist the cooperation of housewives in saving waste fats, it seems hardly necessary to explain the necessity of conserving glycerine. It would require the combined efforts of many thousands of housewives saving waste fats to produce three and one-half million pounds of glycerine which is so urgently needed for the production of explosives and medical supplies. Nitrocellulose,

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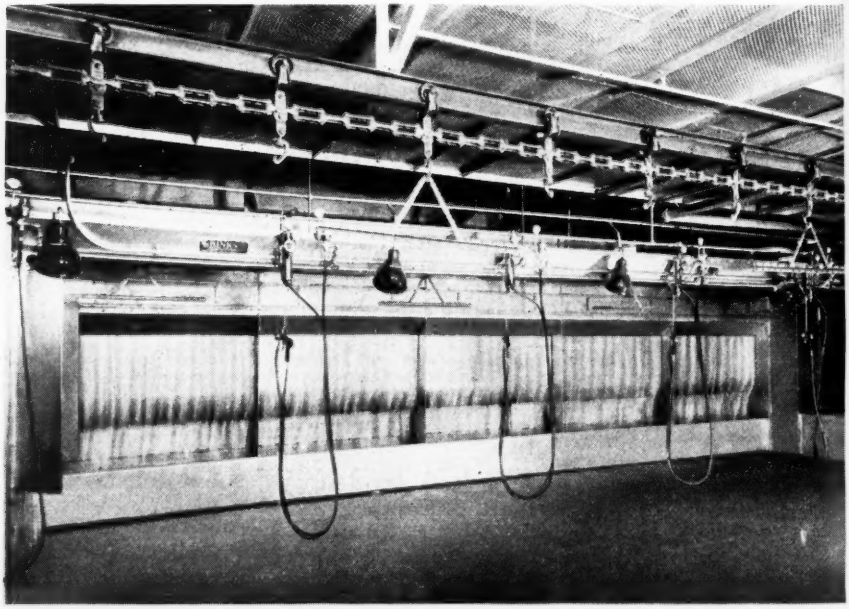
phthalic anhydride and formaldehyde are also more urgently needed for the production of explosives. The supply of vegetable oils is insufficient to meet our needs and those of the United Nations. Imports of natural gums have dwindled to a trickle, due to enemy occupation of the sources coupled with inadequate shipping facilities from those sources in possession of the United Nations.

Reclamation of paint overspray requires the cooperative effort of the consumer and the paint manufacturer. It is the consumer's responsibility to collect the overspray in reclaimable form, while the paint manufacturer's function is to reclaim the material in such a manner as to obtain the maximum of quality. Where the overspray is collected under controlled conditions, it is possible to obtain reclaimed paint which is fully equal to the original in all respects, including durability. As a matter of fact, in some instances reclaimed paint has been found to be superior to the original material.

The use of the term "reclaimed" in connection with paint may be misleading, because reclaimed materials are generally regarded as being inferior in quality to the original material. This is not true in the case of paint. The overspray can be reclaimed to yield a product fully equal in all respects to the original. It would be more accurate to define the process as one of regeneration in the sense that the material may be restored to its original condition and that the product may even be superior to the original.

We may as well anticipate natural curiosity as to how reclaimed paint can be superior to the original. Most industrial paints contain small

Fig. 2—One modern industrial plant makes use of this large water wash spray booth in the painting of cabinets, boxes and similar products.
Photograph courtesy Binks Mfg. Co.



AD-LEA-SIVE

IN BAR FORM*

Broadens the Use of LEA Compound for Burring, Polishing and Buffing

Makes the LEA Method of Finishing More Versatile

AD-LEA-SIVE is a special glue base sizing now available in bar form, making it easy and economical to apply to the wheel for forming a strongly adhering base for LEA Compound. Because several setting up operations can now be eliminated . . . because wheel life and production can be increased . . . because wheel inventories can be reduced . . . ***costs*** can be reduced!

By virtue of this stronger base, LEA Compound, an excellent and already widely used cutting and polishing composition, can be applied to articles hitherto not suitable. Many more articles can now enjoy the economy and better finishing of the LEA Method.

Write for free sample bar of AD-LEA-SIVE and try it in your own operation. Directions for use are on the label.

***Patents pending.**

THE LEA MANUFACTURING COMPANY

WATERBURY 86, CONN.

Burring, Buffing and Polishing . . . 8-LM-6

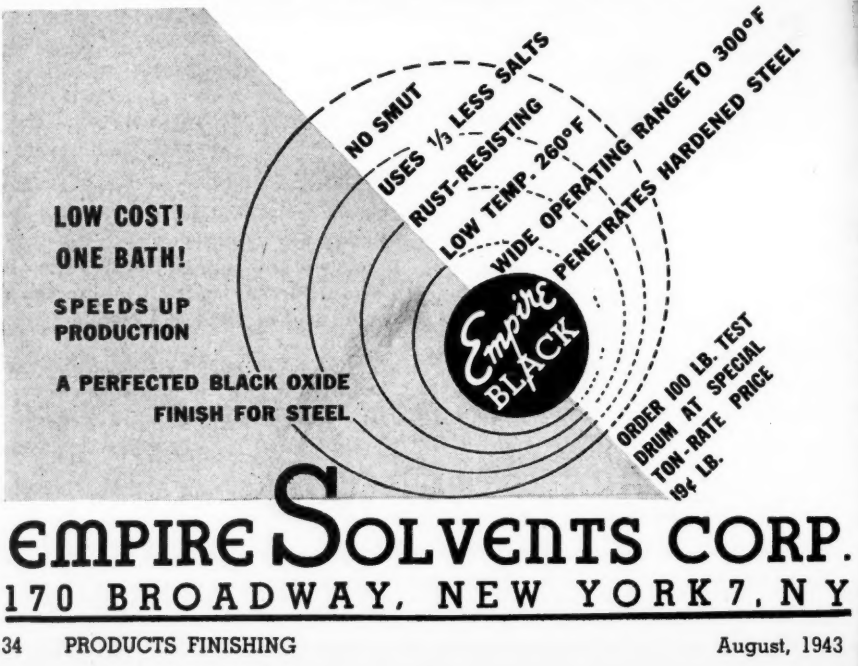
Specialists in the Development of Production Methods and Compositions

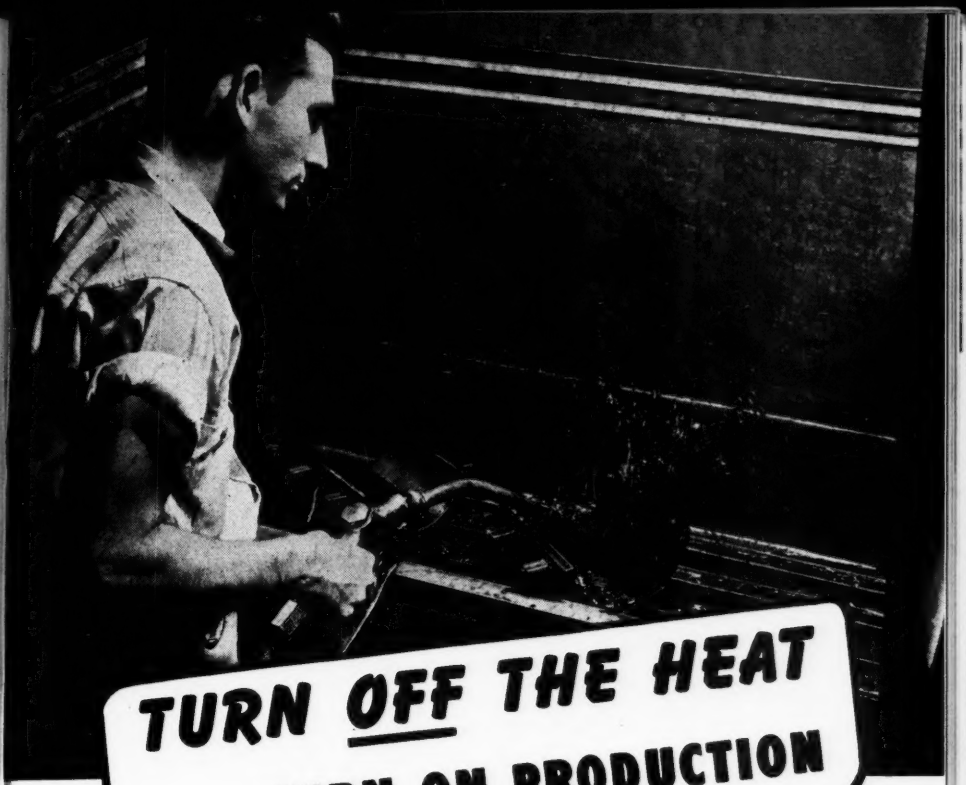
amounts or traces of water soluble impurities. These impurities may be uncombined fatty acids or water soluble salts. They will be leached out of the paint film upon exposure, making the paint more vulnerable to attack by the elements. When paint overspray is collected in water-wash booths, the water leaches out these soluble components. That is one reason why reclaimed paint may have better moisture resistance. The acid value and viscosity of reclaimed paints are generally lower than that in original paint. This may be due to the washing out of the free fatty acids and reaction with the slightly alkaline water. The lower acidity and viscosity of reclaimed paints may account for the fact that they have better flow properties.

When a waste product becomes valuable almost over night, it is sometimes necessary to change habits of long standing. In the case of paint overspray, the personnel of the finishing and maintenance departments must be instructed to handle the material with greater care than might have been exercised when the overspray was discarded. The manner in which the overspray is collected will not only determine whether the material can be reclaimed, but it will also have a vital influence upon the cost of reclaiming and upon the quality of the reclaimed paints.

Collection of Overspray

Once it is established, collection of overspray in reclaimable form is not a complicated procedure, requiring little more effort than is now expended in removing the overspray from the spray booth and transporting it to a dump. Paint manufacturers' technical service men should be qualified to make a survey and to recommend suitable collection procedures. For





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. . . TURN ON PRODUCTION

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LEANS FASTER . . . NO HEATING . . NO MIXING

un Spirits puts the "heat" on war production saving precious cleaning minutes. In this ant, the cleaner formerly used on 37 mm shot d to be heated to 120° F. Decided evapora- on loss was the result. Re-depositing occurred . . oil was not thoroughly removed.

hen a change was made to quick-wetting un Spirits, each minute pore of the metal was enetrated . . . the shot came out sparkling ean. Time was saved because heating, mix- g—all preparation was eliminated. And sts came down considerably.

Whether shot, shells, bomb sights, fuses, cartridge clips, guns or engines are your contribution to American war industry, Sun Spirits will do your metal-cleaning quicker and better. It's a fast, thorough, economical solvent that has the approval of the Fire Underwriters at 100° F. flash.

For information about metal-cleaning in your plant, write to

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HELPING INDUSTRY HELP AMERICA

best results, the responsibility for carrying out the recommendations and for continuous control of the collection procedure should be fixed upon a supervisor capable of securing the cooperation of all concerned.

The essential features of collecting paint overspray in reclaimable form may be summarized as follows:

1. The overspray should be kept wet during collection, storage and shipment to prevent oxidation. Dried overspray should not be mixed with the water wet overspray which is to be reclaimed.

2. Contamination with foreign matter should be avoided.

3. The recovery agent used in the spray booth wash water should not react with the paint ingredients or otherwise detrimentally affect the quality of the reclaimed paint.

4. Collected overspray should be returned to the paint manufacturer in clean, sealed, open-head drums.

The first prerequisite to obtaining overspray in the most reclaimable form is to prevent oxidation by keeping the material wet at all times. Oxidized particles of overspray are insoluble in paint solvents. They may be of such fine particle size as to be difficult to remove from the reclaimed paint and yet large enough to affect the texture and other properties. It will be readily understood that the overspray which collects on the dry surfaces of the spray booth—i. e., the walls, floors and conveyors — should not be mixed with the water wet overspray which is to be reclaimed.

The second precaution is to avoid contamination with foreign matter. The types of foreign matter may be roughly classified in two categories. The first comprises metal objects, such as conveyor hooks, bolts and nuts, discarded tools, and so on. This type is troublesome because it is likely to damage the reclaiming machinery. The second class of foreign matter includes organic matter, such as lunch refuse, old gloves and cloth wipers, masking tape, cardboard and paper lunch wrappings. These materials may disintegrate in the reclaiming process and will become dispersed throughout the reclaimed paint. It may not be feasible to selectively filter the distintegrated organic material from the pigment in the paint. If it is not removed, it will impair the quality of the reclaimed paint. In any event, it is merely good housekeeping practice to segregate waste materials.

In the present stage of development of water wash booths, the water circulating in the system must be chemically treated to keep the booths functioning properly. The ideal condition would be to precipitate the overspray from the air with water alone. In actual practice this ideal condition is rarely attained.

The water with which the circulating system is charged is usually ob-

MINUTES instead of HOURS to dry . .

. . *your* POLISHING WHEELS
with this
Park INFRA-RED DRYER

Now it is possible for you to dry your polishing wheels in minutes instead of hours after application of "head". This is a definite saving of production time over the old method of drying in ovens which usually took twenty-four hours, and required a larger wheel inventory. This PARK INFRA-RED DRYER (patented) requires the minimum of floor space (unit is only 54" square by 66" high) and is furnished with casters so that it can be easily moved out of the way when not in use. Cut down on your wheel inventory with this Park Dryer, by using the same wheel more than once in a single day—write or wire for complete specifications and prices today!

• • •

1. **Even drying is guaranteed.**
2. **Lamps are adjustable to any distance from the wheels.**
3. **Various diameter wheels can be mounted on the drying shaft by use of special bushings.**
4. **Casters furnished with each unit for portability.**

Reasonably fast delivery can be made on both the Infra-Red Dryer and Kold Grip grain cement with necessary priorities.

Park KOLD GRIP GRAIN CEMENT

Park's Kold Grip grain cement is a highly efficient *cold* cement *binder* used to attach abrasive grains to the face of a polishing wheel or belt, and also to cement wheel sections together. Park Kold Grip grain cement can be used as a substitute for glue in setting up any size polishing wheel. It is clean, odorless and is not subject to bacterial attack. Available in 5 or 55 gal. drums.

Park

Liquid and Solid Carburizers ☆ Cyanide, Neutral and High Speed Steel Salts ☆ Lead Pot Carbon ☆ Charcoal ☆ Coke ☆ No Carb. ☆ Carbon Preventer ☆ Quenching and Tempering Oils ☆ Drawing Salts ☆ Metal Cleaners ☆ Liquid Grain Cement

8084 MILITARY AVE. DETROIT, MICH.

tained from municipal mains and is slightly acid. Furthermore, many of the industrial paints contain water soluble acidic components, which are leached out by the water. One of the characteristics of paint overspray is that it becomes progressively stickier as the acidity increases.

After a spray booth system has been in operation for a short time, the acidity builds up to a point where the circulating system becomes fouled with the sticky material, and circulation is reduced or stopped entirely. To prevent this condition, it is common practice to add alkalies of one kind or another to the water. Alkali will keep the spray booth system clean by counteracting the acidity, but it may also react with some of the resins and fatty acids in the paint and with certain types of pigment.

It became necessary therefore to develop a radically new kind of chemical treatment which would keep the spray booths functioning properly without detrimental effect upon the overspray. Chrysler Corporation, for example, played a leading part in the development of recovery agents and processes for reclaiming the collected overspray. More than two hundred different recovery agents were tried without finding one which was entirely satisfactory. Continued research on the problem was finally rewarded with the development of a compound known to the finishing industry under the trade-name "Bricate." Its value as a recovery medium is attested by its ready acceptance and extensive use. It has proved to be low-priced water treatment from the standpoint of maintenance costs. It keeps the spray booths clean for long periods of time—an important advantage in these days of peak production.

Having performed his part of the operation, the consumer returns the collected overspray in clean, sealed, open-head drums to the original manufacturer of the paint. It is custom-

FINISH WAR METALS FAST!

•By Immersion Only •NO CURRENT NEEDED

BON WHITE

WHITE for Brass and Copper

A cold immersion tinning solution for brass and copper in 30 seconds at room temperature.

CUPROMERSE IMMERSION COPPER for STEEL

COPPER Plate for Steel

Cupromerse—immersion copper over steel in less than one minute at room temperature.

the JETAL process

BLACK for Iron and Steel

5 to 10 minute immersion at 284° to 290° F.—with Jetoils for improved rust resistance.

OXIDINE B FOR BRASS & COPPER

BLACK for Brass and Copper

Salts added to water; 5 to 10 minute immersion at 180° to 200° F.

OXIDINE CI FOR CAST IRON

BLACK for Cast Iron

Salts added to water; 5 to 10 minute immersion at 212° F.

OXIDINE Z FOR ZINC

BLACK for Zinc

Salts added to water; ½ minute immersion at 212° F.

ALROSE CHEMICAL COMPANY

Providence, Rhode Island Tel. Williams 3000 - 3001

Facts about Metal Polishing

Importance of Correct Drying of a Glue-bonded Polishing Wheel

ANIMAL hide glue has the property of taking on or giving off moisture, depending on prevailing weather or on the relative humidity in the dry room. Since hide glue reaches its maximum strength when it contains 10% to 12% moisture, the wheels should, therefore, be dried until the glue has this moisture content. This means that the dry room should be regulated not only for temperature but also as far as possible for relative humidity. Ideal drying conditions are 85° F. and 50% relative humidity. If these conditions are maintained with reasonable accuracy, most one-coat polishing wheels can be dried within 24 hours and two-coat wheels within 48 hours.

Drying time is dependent on the thickness of the wheel head; the thicker the head the longer the drying time. The strength of the glue, the abrasive grain size, and the number of coats determine the thickness of the head. For instance, a wheel set up with coarse grain requires a heavier glue solution than one set up with fine grain. For the same number of coats the head is thicker with the coarser grain, requiring a longer drying time.

A practical test to find out when a wheel head is dry enough is to hit it with a round steel bar and observe the readiness with which it cracks.

NORTON COMPANY, Worcester, Mass.

G-145

NORTON ABRASIVES

ary for the material to remain the property of consumer. The paint manufacturer reclaims it and returns the reclaimed paint to the consumer, making a charge for the processing. In this way, the maximum saving is realized by the consumer.

Paint Manufacturers Handle Reclamation

For best results, the reclaiming part of the operation should be performed by paint manufacturers, preferably by the particular paint manufacturer who made the original paint. The operation is in most respects similar to paint manufacture. It requires a paint maker's experience, knowledge and skill to obtain the maximum of quality. It is just as logical for the paint manufacturer to reclaim paint overspray as it is for him to manufacture the paint in the first place. In addition to his greater competence, the paint manufacturer also has the necessary equipment to do the work.

The most desirable procedure from the consumer's standpoint is to have the reclamation performed by the original manufacturer of the paint. In this way, the responsibility for the performance of the original and the reclaimed paint is retained in one place.

The type of reclaiming process used will depend primarily upon the nature of the composition of the paint and, to a lesser extent, upon the type of equipment which is available in the paint manufacturer's plant. In general, the types of reclaiming procedures fall into three classifications: one for lacquers, another for oil base and straight alkyd paints, and a third for the urea formaldehyde coatings. Fundamentally, reclamation consists of dehydrating, redissolving and clarifying. The primary consideration is that the dehydration and the subsequent operations be performed in such a way as not to impair the quality of the reclaimed paint.

It has taken a war to make us realize how unnecessarily wasteful our mass production system has been. One of the lasting effects of the war will undoubtedly be to make us more conservation-minded in the future. There is little justification for adopting or continuing to use any system of spray painting which does not permit the user to realize the economies to be derived from reclamation of the overspray.

Deoxidine No. 170 is the subject of an interesting folder which describes the method of "Deoxidizing" steel artillery shell cases or other steel and aluminum ordnance parts for varnish and paint finishes. Deoxidine No. 170 is a chemical that removes light oil, annealing scale and eradicates rust and rusters, producing a clean, minutely etched, paint-receptive surface. The steps in the process are illustrated. Also available on this same subject is a technical service data sheet giving details on the use of Deoxidine No. 170 and suggested flow sheet for preparation of steel artillery shell cases for specification varnish with A.C.P. Deoxidine No. 170. Copies of this literature may be obtained from American Chemical Paint Company, Ambler, Pennsylvania.

For a real good polishing job use

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TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

DUST and FUME CONTROL is a job for *ENGINEERING SPECIALISTS

* If all dust and fume control problems were alike, there would be no need for specialized engineering service. But these problems vary widely, depending upon manufacturing processes and raw materials used, including many recently developed materials which present entirely new problems. For these reasons, selection of the *right* units for a really efficient dust or fume control system is definitely a job for *engineering specialists.*

The Kirk & Blum Engineering Staff, qualified by over 36 years of experience in this particular field, first makes a thorough analysis of your special dust or fume control problem. Next, our Staff selects the right units for your job from among the various makes available -- then designs and installs a complete system that is guaranteed by Kirk & Blum to give the results you want.

It just doesn't pay to take chances with a dust or fume control system that is "almost right." You don't have to risk being "sold" on units that are unsuited for your particular job. Play SAFE . . . get the unbiased counsel and planning of experts . . . Kirk & Blum Engineers. For details write to The Kirk & Blum Manufacturing Co., 2816 Spring Grove Ave., Cincinnati, Ohio.

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AN ORGANIZATION OF ENGINEERS AND MECHANICS

Solvents and Thinners for Synthetic Enamels

A Discussion of Their Significance in Industrial Finishing and Suggested Methods of Evaluation

By JEFFREY R. STEWART

In this article, the author explains how solvents and thinners can be tested and evaluated by methods which are quicker and equally as efficient as older methods. Any method or system which will give the correct results with a saving of time, labor and money is important—and doubly so in time of war. The article also describes how an industrial consumer of synthetic enamels can conduct a small testing laboratory, thus eliminating many of the difficulties associated with spray shops which exercise little or no control over the materials purchased. Another desirable feature pointed out by the author is the fact that nearly all of the tests can be conducted by a laboratory worker with little or no experience.

THE terms "solvents" and "thinners" are very broad in their meaning and, for this reason, it is important at the outset that we decide which type is under discussion. Turpentine, which for many years had been considered the orthodox thinner, is now only rarely used in spray shops where materials are being finished at a high rate of speed. Thus we can eliminate any reference to turpentine, at least for the time being. Likewise, denatured alcohol can be eliminated because it is only used for spirit varnishes such as shellac and certain fossil resin varnishes.

This leaves the hydrocarbon type of solvents, which are by far the most important for use in the industrial spray shop, especially when they are used in conjunction with the newer types of synthetic enamels. These important hydrocarbon solvents are divided into two classes, known as aromatic hydrocarbons and aliphatic hydrocarbons. The layman or spray mechanic will know them by the less scientific names of "coal tar solvents" and "petroleum thinners."

Coal tar hydrocarbons are those such as toluene (toluol), benzol (benzene), and solvent naphtha (more correctly known as industrial xylol). Petroleum hydrocarbons are those such as benzine, naphtha, gasoline, lacquer diluent, mineral spirits (same as dry

cleaner's naphtha), and kerosene (often called by the incorrect name of coal oil). It will only be necessary for us to discuss industrial xylol in the coal tar class, and mineral spirits in the petroleum class, because these are the two which have proved to give the desired properties. Before Pearl Harbor, toluol was considered a very highly desired solvent, but its use as a solvent during World War II is highly restricted, since it is now in great demand in the manufacture of TNT (tri-nitro-toluol).

Almost any of the desired characteristics can be obtained by blending mineral spirits with industrial xylol in varying proportions. The U. S. Army suggests a formula which will produce a thinner of the required solvent power (solvency) and boiling range. This is as follows:

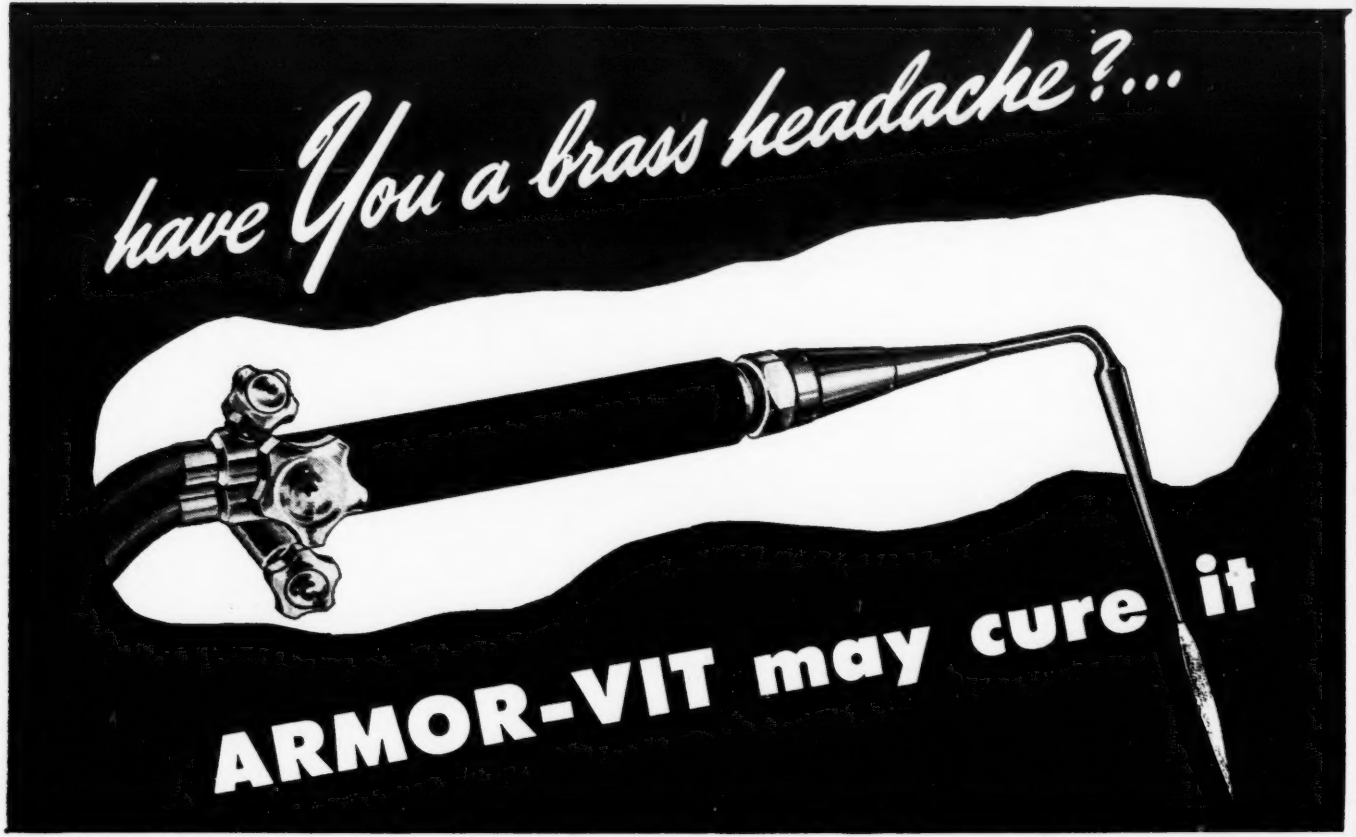
	Percentage by Volume
High solvency thinner (90 per cent aromatic content. Boiling range, 135 to 180 deg. C. Mixed aniline point, 19 deg. C.)	50 per cent
Low solvency thinner. (Usually mineral spirits with a boiling range of 150 to 225 deg. C., and a mixed aniline point of 60 deg. C.)	50 per cent
Total	100 per cent

This formula is merely used as a comparison standard. Any combination or blend of several solvents is permissible under most government specifications, provided the material passes all the requirements given in the specifications.

Suggested Methods of Evaluation

Of all the ingredients or raw materials used in paints and enamels, the easiest one to test or evaluate is the thinner or solvent that is used to bring it to the desired consistency. A small testing laboratory can be set up for this purpose at a very modest expense. This will enable the industrial consumer to determine whether or not his solvents are up to the established standard. It will also aid him in determining which one of several competitive products is the most desirable, thus serving as a guide to the purchasing agent. There are about eleven tests which can be conducted, but, if desired, this can be reduced to five or six; the data obtained may still give some indication as to the value of the solvent. The writer has established a series of tests which can be made in a relatively short time and still give considerable significant information. These have been successful

Fig. 1—The Tag Closed Cup Tester illustrated here is a popular instrument for determining the flash point values of all volatile flammable liquids with flash points of less than 175 deg. Fahrenheit.



critical metals)—even for vitally needed equipment—whether torches or tanks. But

lacquer, or synthetic finishes. It is non-volatile; non-explosive. The coating is only 1/1000th

critical metals)—even for vitally needed equipment—whether torches or tanks. But many manufacturers have cured their brass headaches by turning to **ARMOR-VIT. ARMOR-VIT** is such a remarkable coating for metal it gives iron or steel many of the vital resistance properties of the scarce metals.

ARMOR-VIT is a new and revolutionary metal finish which is amazingly resistant to rust, corrosion, impact, heat, abrasion, scratch, acids, alkalis, thermal shock, weather, salt spray, or other elements. Being priority-free, it might readily make it possible for you to substitute iron or steel in your product for the more critical metals such as zinc, brass, copper, chromium, cadmium, tin, etc.,—yet actually improve the resistance and wearing qualities such metals possess.

Investigate this remarkable finish. It is applied by spraying, then cured through a heat cycle starting at 250° and ending at 700° F.

ARMOR-VIT and [illegible] quer, or synthetic finishes. It is non-volatile; non-explosive. The coating is only 1/1000th of an inch in thickness—so it goes farther and lasts longer. There is an accredited **ARMOR-VIT** applicator convenient to your plant. Write for full details.

ARMOR-VIT DIVISION
CHICAGO VITREOUS ENAMEL
PRODUCT CO.
Cicero, Illinois

HIGHLY RESISTANT TO RUST [illegible]RROSION, HEAT, IMPACT, ABRASION, SCRATCH, ACID, ALKALIES

for several years. The information is passed along to readers of PRODUCTS FINISHING and especially to any organization that wishes to add a small testing laboratory to its plant.

Comparison and Correlation of Various Methods for Determining Flash Point*

OIL OR SOLVENT	Abel	TAG Closed	Elliott	Pensky-Martens	Cleveland Open Cup	Luchaire (French)	Fire Test
Naphtha	86	92	92	95	100	100	110
Naphtha	94	103	98	105	115	122	130
Water White Kerosine	127	130	128	135	140	138	160
Petrolite	142	139	140	150	155	144	175
Gas Oil	...	...	...	195	200	198	220
300 Oils	...	...	...	255	265	266	305
Straw Oil	...	...	...	315	325	322	385
Ice Machine Oil	...	...	...	400	385	402	460
Engine Oil	...	...	...	430	440	430	515
Cylinder Oil	...	...	...	505	525	507	610
Heavy Cylinder Oil	...	...	...	510	560	510	635

NOTE: Above table is only approximate and should not be used for purpose of conversion. It is given merely to indicate the relative values obtained on different Flash and Fire Test Instruments.

TABLE I

General Appearance

Nearly all consumers insist that the thinner shall be perfectly transparent and free from suspended matter and water. This is what is usually termed "general appearance." No apparatus is required for this test, since it is merely a quick visual examination in any glass container such as a test tube or glass cylinder.

Color

The reason why we always note the color of a solvent is that color is usually a good indication of the care or degree of refinement exercised in the production stages. Nearly all solvents appear to be water-white when observed in bottles or cylinders of small diameter. For this reason, the color test should be made in wide diameter vessels or by measuring the color by looking down through the liquid. Nessler tubes are highly desirable for this purpose.

The method of testing the color of solvents is rather simple. The best way to make the test is to prepare a solution of 0.0048 grams of potassium dichromate in a liter of distilled water and use this as the comparison standard. A Nessler tube is filled with the liquid and compared against another Nessler tube containing a sample of the solvent under test. If the solvent is darker than the potassium dichromate solution, the material is subject to rejection at the option of

*Reprinted by permission from the National Paint Dictionary, Second Edition, page 181.

DEOXIDINE

FIRST AND STILL THE BEST ANSWER TO

A Proper Preparation of Steel Surfaces For Lasting Paint or Varnish Finish

Requirements of Army and Navy Ordnance Departments have made necessary the use of steel for shell and cartridge cases. Proper protecting finish of these steel shell cases to withstand shipment under all climatic conditions is vital. Deoxidine No. 170 meets U. S. Ordnance Department requirements for efficiency in removing rust and neutralizing rust producers before protective finishes are applied.

ACP Research Laboratories developed Deoxidine at the time the automobile manufacturers were having trouble introducing steel bodies, due to unsatisfactory paint finishes. The development of Deoxidine made possible a proper, lasting finish for the steel body. Refrigerator manufacturers and countless other steel fabricators of products requiring paint finish were quick to adopt the Deoxidine method.

DEOXIDINE

- Removes Rust
- Eradicates Rust Producers
- Removes Light Oil
- Removes Annealing Scale
- Produces a Minutely Etched Paint Receptive Surface

There are numerous types of Deoxidine to meet the varying needs of manufacturers. The experience of the ACP Laboratories and Technicians is at your service in adapting our products to your particular requirements.

MANUFACTURERS OF INHIBITORS AND METAL WORKING CHEMICALS

CHEMICALS ACP PROCESSES

AMERICAN CHEMICAL PAINT CO.

AMBLER ACP PENNA.

Note—West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 59th St., Los Angeles, California.

AMERICAN CHEMICAL PAINT COMPANY, AMBLER, PA.

Please send me Bulletin on DEOXIDINE

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Company_____

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GLOBE-DESIGNED
Burr-Master

SPEEDS DIFFICULT DEBURRING OPERATIONS ON HARDENED PARTS

The new Burr-Master Tumbling Barrel was originated by Globe to provide a more rapid means of cleaning and deburring today's tougher metal parts The exclusive high, narrow construction of the barrel confines the work to a smaller area thereby achieving maximum pressure

The barrel itself is a two-piece, welded steel jacket lined with tough, seasoned maple that cushions the parts against nicking. The inner linings are easily and quickly replaced. The Burr-Master comes in two sizes. The Standard (illustrated) and the Senior. The Standard is equipped with a low-speed, gear-head motor and is the tilting type for easy loading and unloading. The Senior is a double compartment, horizontal type with water-tight shells. The Senior is recommended where large quantities of parts are to be deburred.

Write today for complete information about the savings you can effect with Globe Burr-Masters in your finishing department. No obligation.

THE GLOBE MACHINE AND STAMPING COMPANY
CLEVELAND 2, OHIO

the buyer. Nearly all the solvents on the market today, however, are lighter in color than this comparison standard.

In the event that one is able to go to the expense, mechanical devices for testing color are available from several of the laboratory supply houses. So far as the writer knows, twenty-two different devices are offered, ranging in price from $12.50 to $150. The chief advantage of the mechanical type of colorimeters or color comparators is the fact that a definite numerical value is obtained, whereas in the above-mentioned method, the results only indicate whether or not the material passes specifications.

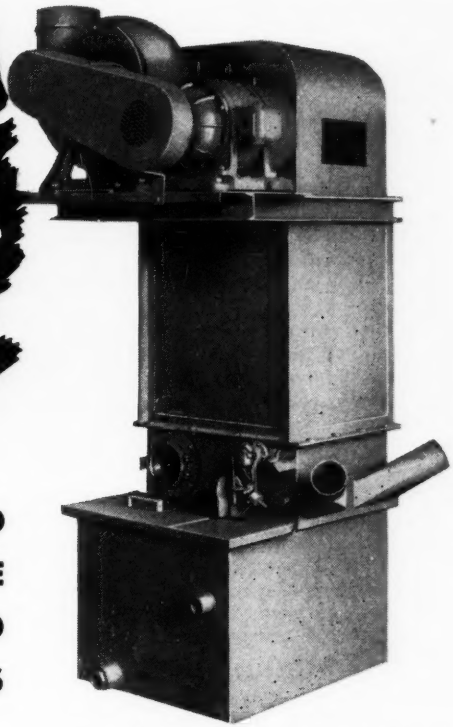
The Spot Test

This test is merely one which indicates whether or not all of the solvent will evaporate within a certain time limit. It is important that no residual compounds such as oils, waxes, and so on, be retained after the solvent has evaporated, since this would cause the synthetic enamel to dry to a comparatively soft film, or perhaps prevent the film from drying at all. The spot test is another of those methods which is rather simple, but at the same time gives some important information. A few drops of the solvent are used to wet a piece of filter paper. The paper is then hung up to dry under atmospheric conditions which are approximately the same as those in which the synthetic enamel is to be applied. After drying for one hour, the filter paper is examined. A satisfactory solvent will not leave a spot.

The Degree of Fire Hazard Can Only Be Measured by the Flash Point Test

The flash point of a solvent is merely an arbitrary ignition temperature of its saturated vapor. Seven different instruments for testing the flash point are on the market; however, all of these testers do not give the same re-

Another Hydro-Whirl of the Orifice type



ESPECIALLY DESIGNED FOR DOUBLE SPINDLE GRINDING AND BUFFING LATHES

Its cleaning action is produced by the force of air issuing through an orifice. Its only mechanical moving parts being a fan and a motor, this Hydro-Whirl unit meets the country's effort to conserve critical materials.

The water level is controlled by a specially constructed diaphragm valve. Sludge removal compartment is at side.

Pictured here is a unit made for a large magnesium processor. Larger models are available to meet any specific conditions.

The Hydro-Whirl principle of dust collecting is receiving high acclaim for its high efficiency. It is to your advantage to talk to us if you have any dust problems, particularly those involving magnesium processing

HYDRO WHIRL

INDUSTRIAL EQUIPMENT CORPORATION

formerly Industrial Sheet Metal Works

630 EAST FOREST AVENUE • • DETROIT, MICHIGAN

sults and, for this reason, a correlation table is often used to convert from one system to the other. Table I shows the comparison and correlation of various methods for determining flash point.

Figure 1 shows the Tag Closed Cup Tester, an instrument which is widely used for determining flash point. Complete instructions are supplied with each instrument; hence it will not be necessary to discuss the method of testing here. No special skill is required to operate the apparatus and a laboratory worker, after making three or four determinations, can duplicate his or her reading very closely. The U. S. Army Specifications state that a solvent must have a flash point of not lower than 80 deg. Centigrade.

The flash point of a solvent is also important for fire insurance purposes. The fire insurance inspectors and rate men almost always want to know the flash point of the solvents being used. Usually, the lower the flash point, the higher will be the premium on the fire insurance policy.

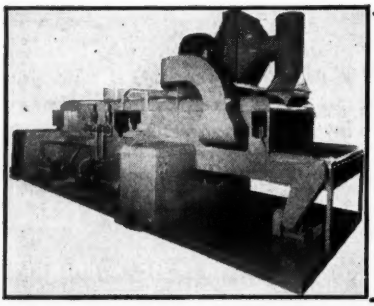
Copper Corrosion Test

The copper corrosion test is used to determine the presence of objectionable sulphur in the solvent. A piece of polished copper, 3 inches by ½ inch in size, is placed in a flask with 100 ml. of the sample under test and is heated to the boiling point for thirty minutes under a reflux condenser. After this operation, the copper strip is carefully removed, allowed to dry and coated with a spar varnish. This varnish coating is applied to prevent further oxidation and also to seal on the copper sulfide coating, if any is present. This forms a convincing exhibit which can be used for demonstration purposes. The varnish coating also makes it possible to mail the exhibit from one place to another in the event that it is necessary to prove a point. It is a good idea to run a blank of a sample known to be free from objectionable or reactionary sulphur compounds, although this is usually only done where a dispute arises as to the accuracy of the results.

When interpreting the results, it is usual to disregard any slight tarnishing of the copper, but any marked darkening or blackening indicates the presence of objectionable sulphur compounds and can be used for the purpose of rejecting the material.

Distillation Range Often Gives Information Regarding Evaporation Rate

The distillation range is almost always determined by the supplier. Usually it will give some indication as to the rate of evaporation, especially if the percentage of aromatic, naphthenic and aliphatic hydrocarbons is known. Figure 2 shows how the ratio is obtained. The best method to use is the one which has been adopted by the American Society for Testing Materials. The procedure for making this



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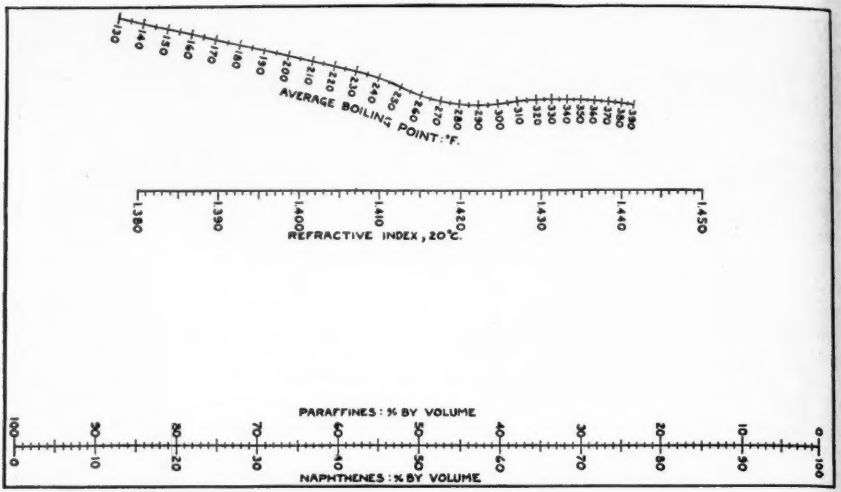


Fig. 2—Nomograph for Determining the Percentage of Naphthenes in Petroleum Thinners

test can be obtained from the society's headquarters in Philadelphia; therefore, it need not be discussed here.

The U. S. Army and the War Department state that a thinner or solvent for a synthetic enamel must have the following distillation range. Note that a certain latitude is permitted in the minimum and maximum temperatures in the different ranges.

First drop .....125 to 155 deg. C.
50 per cent point....145 to 175 deg. C.
90 per cent point....160 to 195 deg. C.
Dry point .....185 to 215 deg. C.

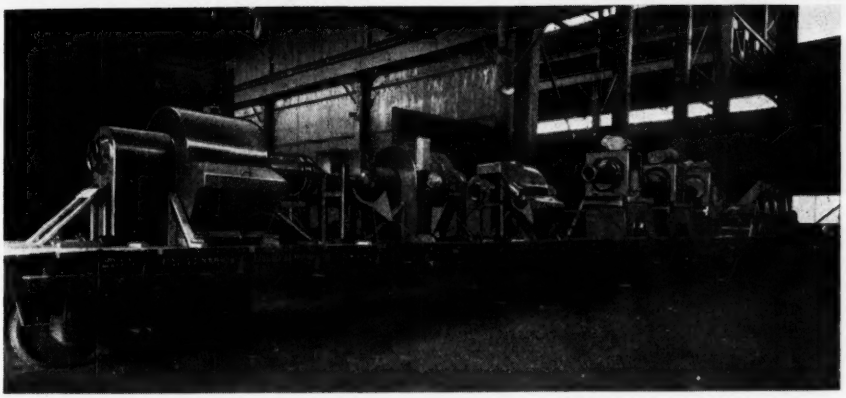
The type of apparatus used in many laboratories for determining the distillation range of solvents and thinners for use in synthetic enamels is shown in Fig. 3.

Solvent Power Test Important

There are three methods of determining the solvent power (solvency) of a solvent, but the most widely used is the kauri-butanol test. In this test, twenty grams of kauri-butanol solution (standardized and certified by an independent laboratory) are placed in a flask, and the solution is titrated with the sample under test until the solution turns cloudy. The number of milliliters required is taken as the kauri-butanol value. The higher the value, the greater is the solvent power. Complete details and specifications for making this test can be obtained by writing to PRODUCTS FINISHING.

In many government specifications and in standards set up by large industrial consumers, it is usual to have some comparison standard. For this purpose, it is customary to specify that the solvent will have a kauri-butanol value which is not less than the kauri-butanol value obtained with a mixture of 40 parts by volume of xylene (xylol) and 60 parts by volume of a straight 60-deg. aniline point naphtha.

In making the comparison, it is important to run both of the tests at the same time and under identical conditions. The kauri-butanol value can be determined without any special skill, although five or six practice determinations should be made by the laboratory worker before any



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results are taken as final. After this experience, he (or she) should be able to make the determination in approximately 15 minutes. The kauri-butanol solution can be obtained at nearly all of the laboratory supply houses. It is more economical to buy the solution ready for use than to try to prepare it in the laboratory.

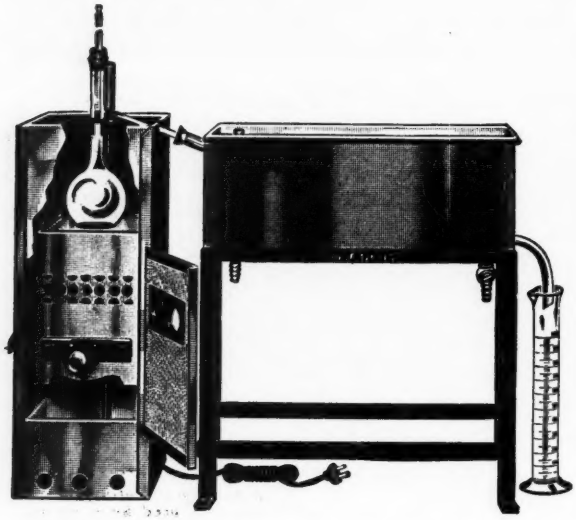

Fig. 3—Shown here is the type of apparatus used in most laboratories for determining the distillation range of solvents and thinners for use in synthetic enamels.

Methyl Orange Used to Measure Acidity

The quickest and most reliable way to measure the acidity of the solvent is to collect the residue from the distillation range determination and test it with methyl orange. If a pink or red color forms, it is an indication that objectionable acid compounds are present. The best way to make the test is to add three volumes of distilled water to the distillation residue and shake this combination in a test tube. Two layers will form upon standing. The aqueous layer is separated by means of a pipette, and one drop of methyl orange indicator is added. The color change, if any, is then observed. The U. S. Army and other governmental agencies have adopted this simple method of testing.

Benzol Should Be Absent

Practically all specifications for solvents and thinners require that benzol must not be present in the sample. Benzol is extremely poisonous and, if it were permitted to be present in solvents and thinners, special care would have to be exercised in their use. In addition to this, certain states and municipalities prohibit by law the use of benzol in spray operations. A test for the presence of benzol is usually not made, because its absence is ordinarily certified by the producer.

Aromatic Hydrocarbon Content Best Measured by Raffinate Method

The only test which will meet with objection from laboratories with a limited amount of equipment is the aromatic hydrocarbon test using the raffinate method. The objection to this test is due to the fact that an Abbe Refractometer is necessary. These instruments are relatively expensive and are also difficult to purchase at this time. However, if a refractometer is available, the test should be made in accordance with instructions supplied by the Ordnance Department of the U. S. Army, a copy of which can be obtained from the Government.

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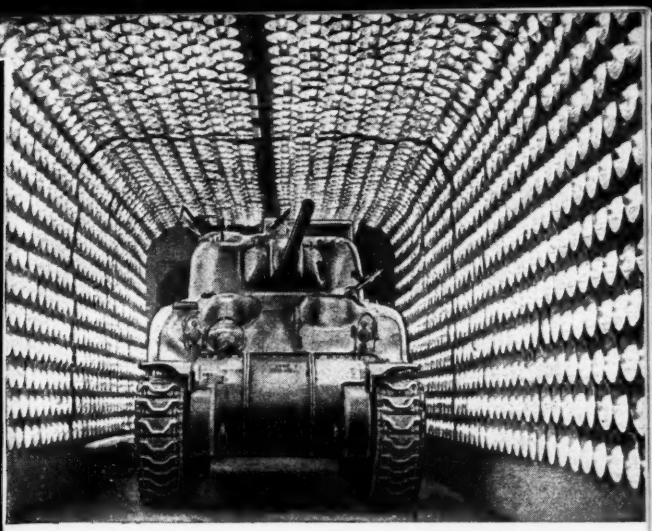

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Driver doesn't even leave seat as freshly painted tank bakes dry in 4 minutes (instead of 24 hours) by passing through this tunnel of Infra-Red Lamps at U. S. Army Ordnance Depot, Chester, Pa.

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Exhaustive tests by industrial leaders have led to the adoption of Birdseye Infra-Red Heat Lamps by such outstanding wartime producers as Allis-Chalmers, Bulldog Electric, Curtiss-Wright, Dow Chemical, Square-D and many others.

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Lucite Plastic Speeds Chrome Plating of Bomber Landing Gear Pistons

THE crystal-clear plastic, known as "Lucite" (methyl methacrylate resin), has been utilized for a new, speedy method of chromium plating Helldiver dive bomber landing gear pistons at the Columbus, Ohio, plant of the Curtiss-Wright Corporation. Lucite tubing is being used as a protective shield over the treated end of the piston during plating. The protective cap, in addition to functioning quite satisfactorily, also has solved a problem involving uneven plating along the piston.

Prior to the adoption of Lucite, considerable difficulty was encountered in throwing the chromium against the shoulder at the bottom of the piston where 0.006 inch of chrome per wall was required. The original thread protecting cap was made of steel and sprayed with stop-off lacquer to prevent plating. According to W. C. McDaniel, general foreman of the Heat Treating Department at the Columbus Curtiss-Wright plant, the use

Roy Cochran, plater at the Columbus, Ohio, Curtiss-Wright plant is seen removing from the chrome plating bath a Helldiver dive bomber landing gear piston with "Lucite" adapter covering the finished end.

Don't Be Confused!

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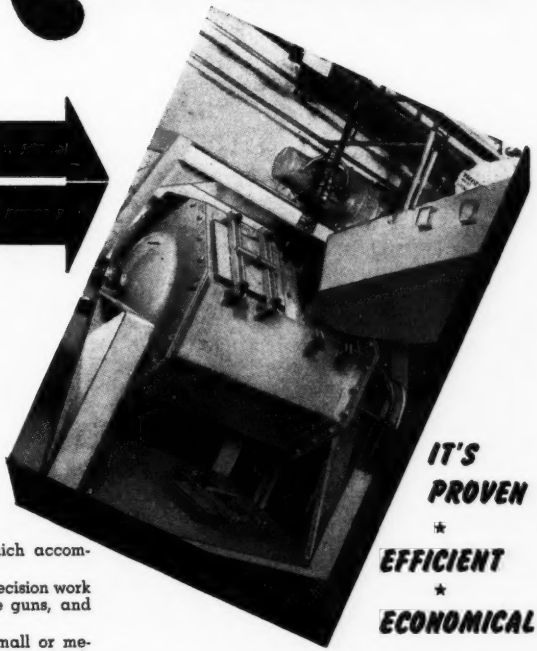

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It is a NEW and UNIQUE method which accomplishes almost unbelievable results.

Roto-Finish enables you to handle fine precision work on parts for airplane engines, machine guns, and countless other war production parts.

With Roto-Finish thousands of parts—small or medium—can be deburred, buffed, polished, and colored, either before or after plating, thus cutting down costly hand production methods.

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of the steel fixture made it necessary to overplate the top of the piston 0.003 inch or more in order to provide a finish grind surface at the shoulder. This resulted in plating the pistons three to four hours longer than would be necessary if it had been possible to deposit chromium equally along the entire length.

An additional problem was a much longer grinding operation made necessary because of the large amount of chromium at the top of the piston. An investigation showed that the protecting cap would "tree" with chrome, shade off the bottom, and draw current from the piston. The discarded method called for an average plating time of 12 hours for each piston.

Searching for a material which would withstand the powerful cleaning and plating solutions and, at the same time, not plate or tree, it was discovered that Lucite plastic would fulfill all requirements. The plastic proved able to withstand all cleaners, acids and the chrome plating solutions without signs of deterioration. It is also easy to machine.

Replacing the steel protecting cap, a Lucite adapter was devised with a threaded steel insert to screw on to the piston. Over this was placed the Lucite tubing to form a shield level with the top of the flange on the piston. Plating procedure with the Lucite adapter remained the same as with the steel adapter, except that the plastic cannot be placed in a vapor-type degreaser.

The new type adapter at Curtiss-Wright has made it possible to chrome plate the piston walls in slightly over six hours, compared to double that time under the old process. With the new adapter, the required amount of plating next to the flange is now obtained and results in far less grinding time, because the plating thickness has been uniform for the entire length of the piston.

"The plastic is machined and fabricated quite easily at Curtiss-Wright," McDaniel said. "Lucite tubing, rod and sheet have been utilized in other phases of hard chromium plating, such as adapters for inside threads, protecting plugs and insulators on especially designed racks. The major production improvement at the plant through the use of Lucite, however, has been the Lucite adapter for plating landing gear pistons for the plastic can be submitted to constant use without disrupting production, making it unnecessary to strip chrome or remask as was the case with steel adapters."

Detrex Metal Parts Washers. Detroit Rex Products Company, 13017 Hillview Ave., Detroit, Mich., has prepared an attractive illustrated booklet which covers the types of Detrex metal parts washers. Sections are devoted to washers which use petroleum spirits and emulsion cleaners, washers which use alkali cleaning compounds, processing equipment, Triad alkali cleaning compounds, shot testing machines, Perm-A-Clor and Triad degreasing solvents, and other Detrex products. Copy free upon request.

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No longer need plating, degreasing, washing or other processing in metal finishing plants depend on rule o' thumb!

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Sarco has demonstrated in hundreds of plating plants that very simple, inexpensive controls can do the work — when correctly selected and applied.

Three distinct types are available, tailored to the job and ranging from combination trap controls for small tanks, to electric control for chromium plating, where temperatures are held within 1°F. Ask for the bulletins on Sarco Steam Traps and Control for metal plating and finishing.

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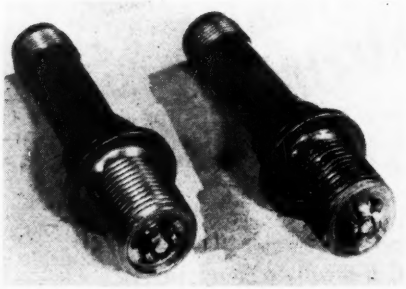
Finishing Facts

Aircraft Spark Plug Shells Cleaned Quickly and Safely

A METHOD for cleaning aircraft spark plug shells quickly and safely, using Turco Type X and Turco DeScaler as the chemical compounds, has been officially approved by the



Aircraft spark plugs, showing (right) the greasy, oily part, heavy with lead and carbon deposits, and (left) the same spark plug after cleaning with the Turco procedure.

BG Corporation, makers of BG spark plugs, according to an announcement made by Turco Products, Inc., 6135 S. Central Ave., Los Angeles, California.

The new method removes all oil, grease, lead and carbon deposits and leaves the spark plug shells chemically clean—quickly, safely and economically. Drag-out losses per gross of shells, using the Turco method, are only about 0.06 gallons of solution or 0.03 pounds of Turco Type X. Under the previous cleaning methods at air maintenance bases, losses were 100 times greater, or about 3 pounds of nitrates per gross of shells.

Briefly, the procedure involves a one-hour submersion of the spark plug shells in a boiling 8-ounce-per-gallon solution of Turco Type X; a thorough water rinse; a one-half hour soak in a 50-50 solution of Turco DeScaler and water; a second water rinse, and then a neutralizing dip into the Turco Type X solution. Shells should then be dipped in oil to prevent rusting. Where re-blueing is desired, this step precedes the oil dip.

Black Finishes Important in War Work

THE intensified demands of war industries for reliable and easily applied finishes are laying special emphasis on the Oxidine finishes and the Jetal process. For brass and copper, Oxidine B is an adhering hard black usable on alloys such as brass and electroplated copper and brass. No special equipment is needed—the salts are merely added to water, heated to 200 deg. F., and the black is obtained by immersion in the bath for 3 to 15 minutes, depending on the alloy. Oxidine B is used in many industries for blackening and protection of instruments, optical goods, ordnance parts, and other applications.

For zinc, Oxidine Z is recommended for its durable velvety-smooth adherent black. It is satisfactorily used on zinc die castings and electroplated zinc. Only simple equipment is re-

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quired, the process calling for the addition of the Oxidine Z salts to water, heating to boiling point, and immersion of the objects from one-half minute to two minutes.

On cast iron, Oxidine CI is said to provide an inexpensive and unusually simple method of obtaining a dense black finish at low temperature. The Oxidine CI salts are added to water and heated to 212 deg. F., after which the cast iron parts are immersed for 5 to 10 minutes. One feature of this process is the fact that no special cleaners are required and the application can be made to a variety of cast iron parts with equal speed and facility.

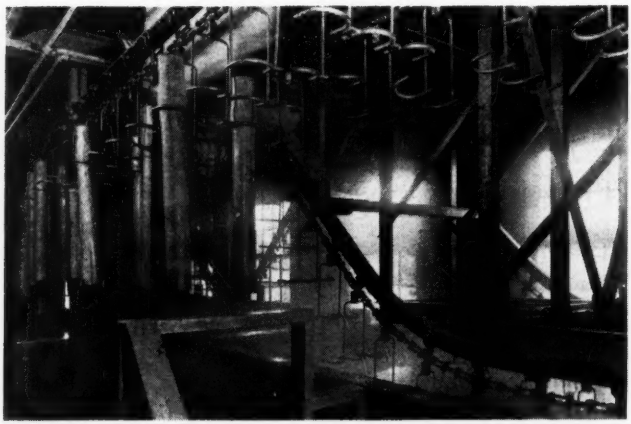
For steel, the Jetal process is widely used as an immersion black finish. This process is said to produce a deep penetrating black by a 5 to 10-minute immersion in a bath prepared by adding Jetal salts to water and heating to 285 deg. F. When the Jetoil process is applied as an after finish, the surfaces so treated will withstand from 25 to 300 hours of salt spray by test, depending on the oil used. Increasing quantities of these products are now being utilized in the finishing of various war materials and are being exported to South American countries.

Complete information on the processes described here is available from the Research Staff, Alrose Chemical Company, 180 Mill St., Cranston, R. I.

Conservation of Cadmium

THE Conservation Division of the War Production Board recently announced a further effort to conserve the available supplies of cadmium for essential war uses. Technical consultants will be available at any time to advise industry in the use of substitutes for this critical material.

Requests for information and help from the WPB consultants should be addressed to the Division of Informa-



An overhead trolley conveyor equipped with special hooks for handling axle housings through acid, rinse and oil baths is shown here. The transverse bend descends into the pickling tank at this particular point, the conveyor moving very slowly so as to give the housings the correct amount of exposure to the acid. The overhead conveyor of this type is frequently the answer to problems where material must be exposed to solutions contained in tanks, due to the fact that the time of exposure can be rigidly controlled and the conveying equipment itself is not affected by the solution.

(Photo courtesy Mathews Conveyer Company)

DU-LITE *leads again...*

The most important recent improvement in the black oxide process for steel finishing is the Du-Lite method of removing foreign material from the processing bath and keeping it clean.

The Du-Lite Clarifier can positively control the accumulation of sludge in the bath either in the form of a solid or in suspension. Unformily high quality finishing is impossible where sludge is present.

Our guarantee of freedom from this trouble is one reason why leading manufacturers look to Du-Lite for the right black oxidizing process.

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MIDDLETOWN, CONNECTICUT

tion, Conservation and Salvage Unit, 1100 H St., N. W., Washington, D. C.

The drive for the conservation of cadmium and the use of substitutes is made by the fact that cadmium production has remained practically stationary for some time and prospects for increased quantities are not bright. WPB pointed out that where corrosive conditions are not severe lead coatings can frequently be used in place of cadmium coatings. Silver castings, black iron oxide, phosphate coating covered with select oils and waxes are other possible substitutes.

Does Your Plant Need Work?

According to a recent announcement, Smaller War Plants Corporation will assist you in obtaining contracts for manufacturing war products for the armed services and government agencies and essential civilian products for civilian needs, also in obtaining subcontracts from prime contractors—

(1) If your company is "small in relation to your particular industry and needs work, or . . .

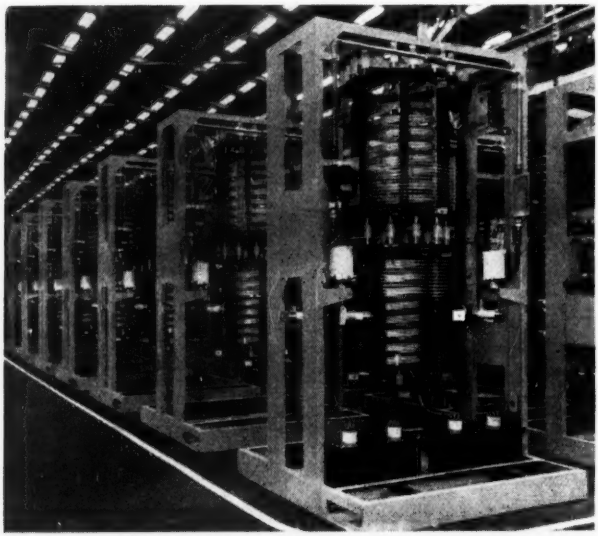
(2) If your present amount of business in hand is 66-2/3 per cent or less of the average volume of business you produced in the years 1936 through 1941, or . . .

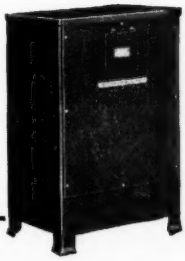
(3) If your present backlog of business will be completed within 30 to 60 days, with no more business in prospect.

The first step is to register with the Smaller War Plants Corporation the fact that your company is in "distress." To do this, fill out accurately and completely the simple form (No. 2282) and mail it, together with a complete list of your machine tools and/or other production facilities, to the nearest district office. A list of these district offices is available from Smaller War Plants Corporation, H.O.L.C. Building, First and Indiana Aves., Washington, D. C.

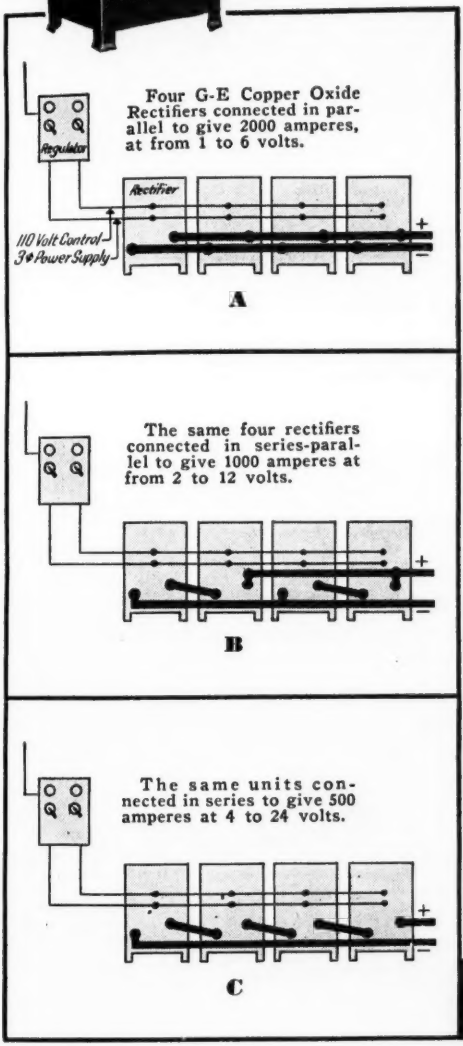
1400 KW for Electronic Tin Fusing

Key units behind the induction heating coils that flow the electrolytically deposited tin plate on steel strip into a smooth, shiny surface are power rectifying tubes, high frequency oscillator tubes and the oscillator tank circuits. Direct current power at 17,000 volts is applied to the vaccum tube oscillators, similar to radio broadcasting transmitters. The d.c. is then converted to high-frequency a.c. power of 200,000 cycles per second and fed into the tuning circuit. Water-cooled copper conductors carry this high-frequency power to the induction heating coil that surrounds the tin coated steel strip. Seven of these 200-kw tuning units, soon to be shipped to steel mills throughout the country, are shown during assembly at the Westinghouse Radio Division in Baltimore. (For a discussion of electrolytic tin plating, see page 40 of the December, 1942, issue of PRODUCTS FINISHING.)





ONE TOOL FOR MANY JOBS


Four G-E Copper Oxide Rectifiers connected in parallel to give 2000 amperes, at from 1 to 6 volts.
Regulator
Rectifier
110 Volt Control 3 ø Power Supply
+
−
A
The same four rectifiers connected in series-parallel to give 1000 amperes at from 2 to 12 volts.
+
−
B
The same units connected in series to give 500 amperes at 4 to 24 volts.
+
−
C

How one electroplater adapted G-E Copper Oxide Rectifiers for various jobs, including still-tank plating, barrel plating and anodizing

A. 6-VOLT TANK PLATING

By connecting four G-E Copper Oxide Rectifiers in parallel, the plater obtained 2000 amperes at from 1 to 6 volts for a still-tank plating job. One regulator for the units gave complete control over the full range output.

B. 12-VOLT BARREL PLATING

When a barrel-plating contract was obtained, it was a simple matter to re-arrange the four rectifiers in series-parallel so as to secure 1000 amperes at from 2 to 12 volts required for the job.

C. ANODIZING

The same four rectifiers were also re-connected in series for an anodizing job requiring 500 amperes at 4 to 24 volts.

OTHER COMBINATIONS

These are only three common examples of the wide variety of groupings that can be obtained with G-E Copper Oxide Rectifiers to serve specific needs, including 40 volt anodizing.

Why not investigate the potential uses of G-E Copper Oxide Rectifiers in your electroplating? G-E Tungar and Metallic Rectifier engineers will be glad to consult with you. Write to Section A-834-70, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn.

GENERAL ELECTRIC

News OF THE INDUSTRY

Price Named Director of Sales for Mitchell-Bradford

According to an announcement by C. M. Bradford of the Mitchell-Bradford Chemical Co., Bridgeport, Conn., increased adaptation of the black oxide process for the treatment of steel to a growing number of war production items, and the attendant increased responsibility of his company to service and satisfy requests for information on this process, has led to the appointment of William H. Price, Jr., as director of sales.

Mr. Price was formerly divisional manager in charge of a large portion of the Eastern Seaboard territory for Mitchell-Bradford Chemical Co. He recently delivered a paper on "The Black Oxide Treatment of Steel" before the annual meeting of the American Electroplaters' Society in Buffalo, N. Y., and is well known among the trade and industry.

Brown Instrument Names Two Vice Presidents

Appointment of George H. Muschamp and Paul L. Goldstrohm as vice presidents of the Brown Instrument Company, a subsidiary of Minneapolis-Honeywell Regulator Company, was announced recently following a meeting of the company's board of directors at Philadelphia. Mr. Muschamp will be vice president in charge of engineering, and Mr. Goldstrohm will be vice president in charge of production. Both posts are newly created.

Mr. Muschamp, who is 34 years old, has been with the Brown engineering department for 12 years and has been in charge of engineering for the past three years. He directed the development of a number of Brown electronic devices, including the electronic potentiometer for controlling industrial temperatures. Mr. Goldstrohm, who is 41, recently celebrated his 20th year with the company. He has been serving for the past two years as assistant general manager and formerly was the company's purchasing agent.

Ferbert-Schorndorfer Appoints Edwin B. Hasseld

The Ferbert-Schorndorfer Company, Cleveland, Ohio, has recently appointed Edwin B. Hasseld of Indianapolis as its representative for the State of Indiana. Formerly connected with Sherwin-Williams Company, Mr. Hasseld is well qualified in the industrial paint field. Eighteen years of experience have given him a thorough knowledge of lacquers, enamels, wood finishing and other paint materials.

Edwin B. Hasseld

TRADE MARK
REGISTERED

One way of registering a trade mark is through legal procedure, but we do it in another way too. We register G I F in the minds of our customers as a symbol of accuracy and precision. It's done on the basis of performance on the production line. Is there a better way? If so, we'd like to know it. Look over the list below and tell us if we may put G I F research to work for you.

- Metal primers for tanks, blitz cans, bombs, gun mounts, etc.
- Lusterless Enamel Finish Coats for use over metal primer.
- Camouflage paints or compounds for metals and textiles.
- Coatings for roll coat application on land mines, gas mask canisters, hand grenades, etc.
- Interior coatings and sanitary lacquers for food and beverage containers.

GENERAL INDUSTRIAL FINISHES
DIVISION • GENERAL PRINTING INK CORPORATION
PROTECTIVE COATINGS
100 SIXTH AVENUE • NEW YORK • N Y

Vernon J. Twyning Dies

Mr. Vernon J. Twyning, vice president of the J. C. Miller Company, Grand Rapids, Mich., died on Tuesday, June 29, 1943.

Atlas Powder Promotion

Leland Lyon, president of Atlas Powder Company, announces that J. K. Weidig has been appointed general manager of the Cellulose Products Department of Atlas Powder Company, including Zapon Division, manufacturers of protective coatings, and Zapon-Keratol Division, manufacturers of book cloths, upholstery fabrics, and numerous other coated fabrics and materials.

Mr. Weidig joined Atlas in February, 1941, when it acquired The Keratol Company of Newark, N. J., of which Mr. Weidig had been a director and general manager. In December, 1942, Mr. Weidig became assistant general manager of Zapon-Keratol Division. Mr. Weidig was born in Newark and educated in the public schools of that city and at Princeton University where he studied special engineering.

G. E. Appoints R. M. Cherry

R. M. Cherry has been appointed assistant manager of General Electric's Industrial Heating Division, according to an announcement by J. E. N. Hume, commercial vice president. Mr. Cherry was graduated from the University of Arkansas in 1919 with a B.E.E. degree in electrical engineering, and became associated with General Electric as a testing engineer in the Schenectady and Pittsfield plants.

In 1922 Mr. Cherry was named industrial heating specialist at the Philadelphia office. In 1924 he entered the Industrial Heating Engineering Department at Schenectady and later was transferred to the Industrial Engineering Department there. Since 1936 Mr. Cherry has been connected with the Industrial Heating Division.

Osborn Promotes Dewey C. Harvey as Chief Plant Engineer

The Osborn Manufacturing Company, Cleveland, Ohio, announces the promotion of Dewey C. Harvey to the post of chief plant engineer. As head plant engineer covering both the brush and moulding machine divisions of the Osborn company, Mr. Harvey will have charge of new construction and plant maintenance, including power plant operations, and will also superintend the installation of new machinery at the factory and home office.

Frederic B. Stevens, Inc., Opens Cleveland Office

Frederic B. Stevens, Inc., Detroit, Mich., has opened a branch office at Room 1123, Fidelity Building, 1940 E. Sixth St., Cleveland, Ohio. This company manufactures foundry supplies and equipment, buffing and deburring compositions, metal finishers' and electroplaters' supplies and equipment.

The Cleveland office will be staffed by experienced men; the foundry and supply equipment field will be handled by Mr. Frank J. Balsley, and the other lines by Mr. Charles H. Stoddard.

Gammel Promoted to Executive Post at Osborn Company

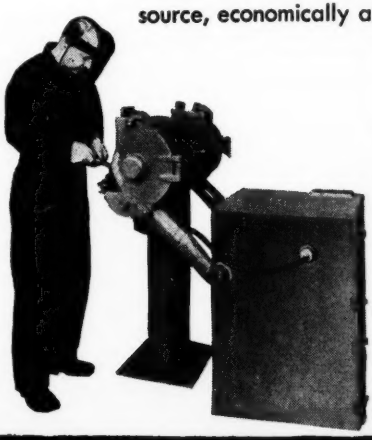
James G. Gammel, formerly industrial brush representative of The Osborn Manufacturing Company in the New England territory, has been promoted to the position of technical assistant in brush engineering service at Osborn's home office and factory, Cleveland, Ohio.

Since joining Osborn, Mr. Gammel has been particularly active in helping war industries increase production through the application of industrial brushing techniques and methods. In his new post, he will extend his brush engineering activities by assisting Osborn representatives throughout the country in applying recommended power brushing methods to increase output and improve quality in war production.

BETTER PLATING, LESS COST!
"MGC" ELECTROPLATING EQUIPMENT
Write for Interesting Details TODAY!
MOTOR GENERATOR CORP., HOBART SQ. BOX PF83 TROY, OHIO

OF DUST HAZARDS..

Don't allow dust to *air raid* your plant, menacing employees' health and efficiency, and destroying your valuable machinery. Sound the "All Clear" by installing TORIT Self-Contained, Portable DUST COLLECTORS. They trap dust instantly at the source, economically and efficiently.

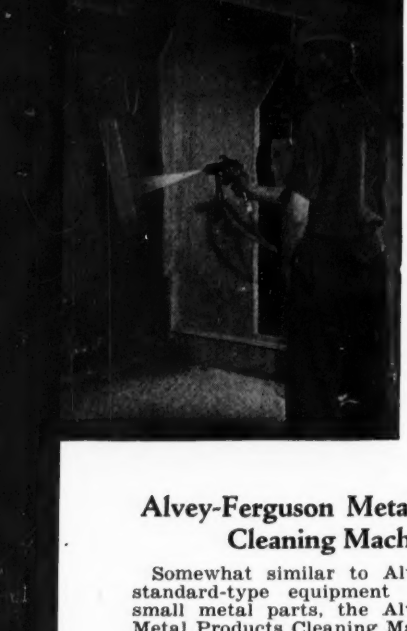


NOTE: Silicosis is oftentimes caused by abrasive dusts. Protect your employees from this hazard.

Inquire further about the advantages of Torit Dust Collectors.

TORIT
MANUFACTURING COMPANY
314 WALNUT STREET • DEPT. A
SAINT PAUL, MINNESOTA

TORIT Dust Collectors
SELF-CONTAINED UNITS

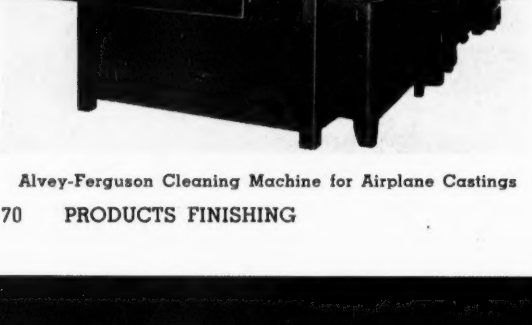


New PLANT EQUIPMENT AND Materials

Alvey-Ferguson Metal Products Cleaning Machine

Somewhat similar to Alvey-Ferguson standard-type equipment for cleaning small metal parts, the Alvey-Ferguson Metal Products Cleaning Machine shown here was especially constructed to speed-wash, rinse and dry miscellaneous airplane castings up to 17 x 36 in. in size with high speed efficiency. It is a product of The Alvey-Ferguson Co., 631 Disney St., Cincinnati 9, Ohio.

The machine is equipped with a 36-in. wire mesh conveyor and combination skim box, drain and overflow. The fan-shaped super-spray is designed to provide maximum cutting action. The pumps and nozzles are protected by screen tanks with removable screens. Other features include parallel welded steam coils; unit model pump with no flexible couplings or sub-bases; marine-type clean-out and inspection doors, requiring no tools for operation; gear head conveyor motor; shear pin hub conveyor drives; spring loaded conveyor take-ups; solution thermometer. The tanks and chambers are constructed entirely of ¼-in. plate.



Alvey-Ferguson Cleaning Machine for Airplane Castings

Miccrostrip

A material known as Miccrostrip has been introduced by Michigan Chrome and Chemical Company, 6342 E. Jefferson Ave., Detroit, Mich., for the removal of protective coatings manufactured by this company.

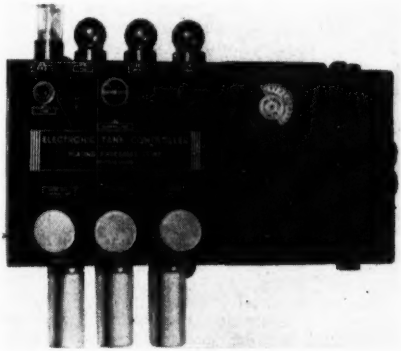
Miccrostrip is said to be especially useful for the removal of lacquer used to mask parts for hard chrome plating or for selective hardening. Former methods of removal required the use of a knife or wire brush — tedious processes which frequently proved damaging to finishes or parts. Within a few minutes, Miccrostrip

makes possible the quick and easy removal of every trace of lacquer, even that which might have accumulated in small inside diameters or other hard-to-reach spots. Containing no acids, it will not affect any metal finish. It is also non-toxic.

Miccrostrip is a combination of solvents and is used entirely as a remover. It is not a thinner. In addition to its use for masked parts, it is effective for the removal of other Miccro coatings such as those used for the protecting of plating racks.

Electronic Tank Controller

An automatic tank controller, called the Automatic Tank Watchman, has recently been placed on the market by Plating Processes Corporation, Holyoke, Mass. The instrument is simple in principle, yet is unusual in the things it will do. For example, it automatically maintains a predetermined solution level, while at the same time controlling temperature, whether the solution has a tendency to heat or to cool. The temperature control section is based on a principle which uses a copper thermostatic bulb for all types of solutions. This principle is said to insure long life of thermostatic equipment.



Electronic Tank Controller

The installation includes warning signals both at the tank and in a watchman's station, thus affording a constant record of activity. Furthermore, it is designed to provide automatic starting and stopping, thus guarding against a tank being accidentlly left in operation overnight. It can be set to start operations at a predetermined hour in the morning.

The controller is being marketed in various models to fit a wide range of requirements.

Franklin Rust Inhibitor

An effective protective coating, to be known as Franklin Rust Inhibitor, has been announced by the Franklin Research Co., Inquirer Building, Philadelphia 30, Pa. It is a wax-resin emulsion which, by dipping or spraying, covers the metal with a dry, tough film. This film, it is claimed, has high resistance to corrosion, is neither greasy nor sticky, and will not rub off or stain through packaging.

The coating is produced in transparent, amber and black. The black Rust Inhibitor has a dual use. When applied to a dark material, like the dark gray obtained when the metal has received a treatment such as Parkerizing, it not only nearly doubles the resistance to corrosion, but also gives a rich, black finish. It is also claimed that Franklin Rust Inhibitor is non-inflammable and non-toxic.

Under normal room conditions, the film dries in approximately two minutes, but when applied to warm metal, the drying is almost instantaneous. Suggested uses of this protective coating include protection of rough castings as well as polished metal faces awaiting subsequent operations; coatings for shells, machine gun belt links, tracer casings, tools and a great variety of polished metal items in transit or storage. The extreme thinness of the protective film is said to make it ideal for parts which subsequently must be fitted with small tolerances.

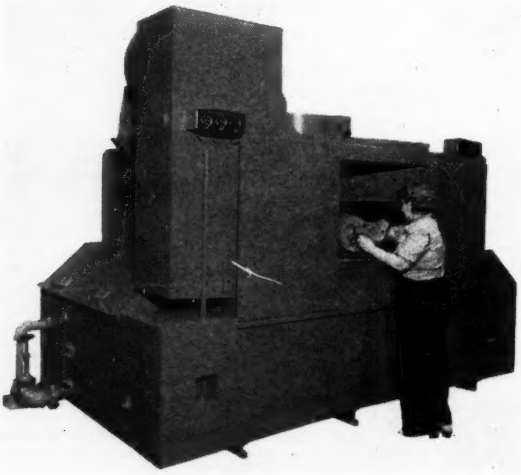
If necessary, the film may be removed simply by the use of steam or any of the degreasing processes.

Segmented Cabinet Washing Machine

The machine illustrated here is manufactured by the Industrial Washing Machine Corporation, 291 Burnet St., New Brunswick, N. J., and is known as the segmented cabinet washing machine. The outstanding feature of the machine is a large mesh turntable which rotates slowly; special fixtures can also be supplied, depending on the nature of the work to be cleaned. Surrounding the turntable is the housing which is por-

tioned off into various sections for washing, rinsing (or slushing), and drying.

The parts to be cleaned are placed either directly upon the mesh or on the fixtures. As the turntable rotates, it carries the work through the above-mentioned cleaning operations and returns it to the same operator who does the loading. Production ranges from 1½ to 7½ sq. ft. of work per minute.



Segmented Cabinet Washing Machine

Advantages of this type of machine are said to be:

1. Only one operator needed.
2. Small floor space occupied (10½ x 6½ ft.).
3. Maximum spray coverage.
4. Experienced operator unnecessary.
5. Any of the cleaning detergents now on the market can be used in this machine.

Machines of this type are now in use cleaning cylinders, gears, piston rings, connecting rods, master rods, pistons, machined castings, die castings, rocker arms and flexible metal conduit.

"Diamond" Rust Inhibitor

The Diamond Alkali Company, Pittsburgh, Pa., has recently perfected a rust inhibitor especially suitable for shell cartridge cases. Outstanding features of the material are said to be the saving of time and the suitability of the protection before lacquering. The compound is used in an aqueous solution to inhibit the formation of rust on clean, pickled steel or iron, and is said to form a rust-free tight bond for the application of paint, varnish or lacquer.

It is claimed that no visible or measurable coating is deposited by the inhibitor and the company's chemists call its action one of passivity. The solution, which runs 14 oz. of materials for each 100 gal. of water, has a pH of slightly above that of tap water.

The recommended usage of the inhibitor, which so far has been used almost entirely in the steel cartridge case industry, is as follows: (1) Hot alkali clean to remove all traces of grease, oil and dirt; (2) Overflowing flush rinse; (3) Pickle (sulphuric acid 10 per cent by weight) 160 to 180 deg. F. to remove all rust and scale; (4) Cold overflow flush rinse (twice to insure acid removal); (5) Make up rust inhibitor tank at 14 oz. per 100 gal. of water. Keep tank hot, from 160 to 180 deg. F. Dip the article following operation No. 4 for 30 sec. to one minute; (6) Hot forced air dry immediately following operation No. 5

The company has found that a cold rinsing seems to insure that article keeping wet from the time it leaves the pickle bath until it gets into the inhibitor. It is claimed that this eliminates the possibility of rusting, which might result with a flash drying action encountered by using a hot rinse. The company recommends an overflowing or a flush rinsing to insure removal of pickling acid before entering the rust inhibitor.

According to the manufacturer, steel cartridge cases which have been processed with the rust inhibitor have withstood the salt spray, abrasive and firing tests of the Army.

Nalco Dritherm Carbon Filament Lamps

North American Electric Lamp Company, 1020 Tyler St., St. Louis (6), Mo., announces a complete line of Nalco Dritherm Carbon Filament Lamps for infra-

safe, fast aluminum cleaning with

AIRLION #81

● For pre-cleaning and cleaning aluminum before anodizing, chromatizing and phosphatizing or spotweld etching – TURCO AIRLION 81 does a fast, safe cleaning job. It is non-corrosive to aluminum, magnesium and steel. Its action is fast, penetrating and detergent although it contains no soap to attack aluminum or form a hard water scum . . . it is free-rinsing and LASTS LONGER.

Buffered above a pH of 10.5, the greater part of the titratable alkalinity of TURCO AIRLION 81 constitutes a faster, more powerful agent for hot tank cleaning prior to processing. All its chemical ingredients are active . . . it contains no wasteful, inert ingredients. TURCO AIRLION 81 is a longer-life cleaning compound.

TURCO PRODUCTS, INC.

Los Angeles—Chicago
Main Offices & Factory—6135 S. Central Ave., Los Angeles, Calif.
Midwest Factory—4856 S. Halsted Street, Chicago, Ill.
Service Representatives & Warehouse Stocks in All Principal Cities

Speed your cleaning of aircraft metals before processing with TURCO AIRLION 81.

54-83

TURCO PRODUCTS, INC.
6135 So. Central Ave. • Los Angeles, Calif.

Please send free literature and information describing the TURCO AIRLION 81.

NAME _____ TITLE _____

FIRM _____ STATE _____

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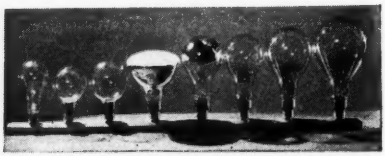
red ray drying, baking and dehydrating. The line includes the inside-silvered, self-reflector type lamp and the bull's-eye silver type lamp for diffusion and



Nalco Drithe:m Carbon Filament Lamps

concentration of the ray. Nalco lamps are of the carbon filament type which, the manufacturer claims, yield maximum efficiency in the desirable infrared ray band with a minimum of visible light. Sturdy construction and the ruggedness of the carbon filament are features of the lamps.

Zapon S-631

Zapon Division, Atlas Powder Company, Stamford, Conn., announces that it has perfected Zapon S-631, a bomb finish which meets U. S. Army Ordnance Specification No. AXS-946. The new formulation was especially developed to meet the mandatory requirements for finishing bombs and heavy ammunition which became effective July 1, 1943. Zapon S-631 is now available for this important job.

Turco Redi-Paint

Permanent paint adhesion on galvanized metal—with no chipping or peeling—is said to be insured now by preparing the galvanized surface before painting with Turco Redi-Paint made by Turco Products, Inc., 6135 S. Central Ave., Los Angeles, California.

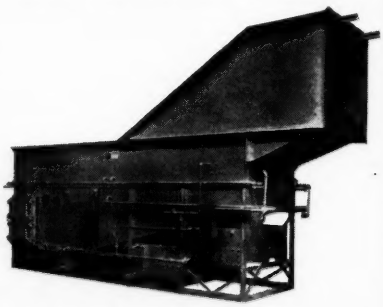
A unique feature of Redi-Paint is color control; a dark tint develops on areas properly treated, leaving the untreated area conspicuously bright. Through the use of Redi-Paint, the surface of the galvanized metal is "c h e m i c a l l y" changed, giving a permanent protection and base for the paint. The compound does this by displacing the slick, oily surface typical of galvanized metal with a roughened, "toothy" surface to form

BLAKESLEE DEGREASERS

SPEED-UP PRODUCTION

Maintain production and obtain 100% grease-free metal surfaces with Blakeslee Degreasers. Efficient engineering design and construction insures production and *lowest* solvent operating costs.

We would welcome the opportunity of discussing the application of Blakeslee Degreasers or Metal Parts Washers with you and just how your production may be speeded and cleaning costs cut. An engineer will be pleased to call on you without obligation on your part.



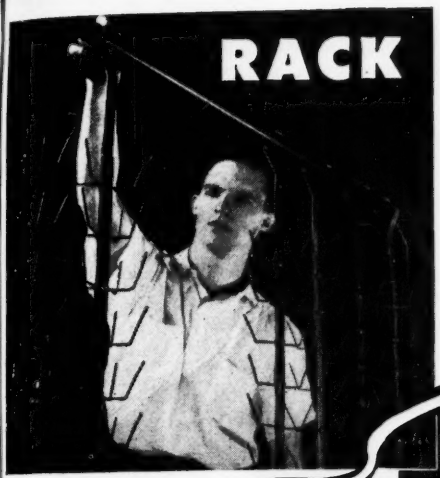
G. S. BLAKESLEE & CO.

CICERO STATION

NEW YORK CHICAGO TORONTO

RACK COATINGS

Developed To Meet The Requirements Of SPECIFIC PROCESSES



Plating racks used in the usual cycles are subjected to attack by various acids and plating solutions, alkali cleaners and petroleum spirits, depending on the processes required for individual parts. NO SINGLE RACK COATING MATERIAL PROVIDES THE PROTECTIVE QUALITIES NECESSARY TO PROVIDE EFFECTIVE CHEMICAL RESISTANCE THROUGH ALL PROCESSES.

Miccro Products — the largest selling rack coating materials in use today — are available to meet *individual* needs . . . not only for protective qualities necessary in specific processes but also for the most practical and desirable methods of application. In Miccro-Supreme Stop-Off Lacquers, Miccrolite or Miccroflex you will find the materials exactly suited to your particular requirements. Used singly or in combination as instructed, they will provide the complete protection so necessary for efficient and economical use of your racks.

Miccro Products, too, are supplied for many other protective purposes. Write for full information on the complete and varied lines available today.

Miccro Supreme

STOP-OFF LACQUERS

★

MICCROLITE

★

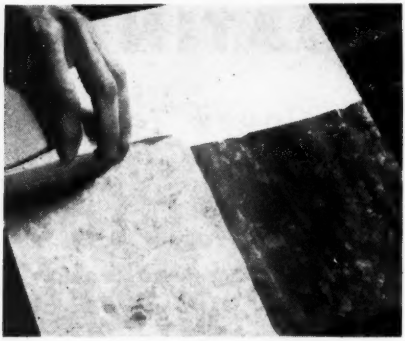
MICCROFLEX

★

Developed and Manufactured By Experienced Platers

MICHIGAN CHROME & CHEMICAL CO.

6342 EAST JEFFERSON • DETROIT 7, MICHIGAN



Paint peels and chips from galvanized metal which has not been properly prepared prior to painting, as shown in the panel at the left. The section at the right, which has been treated with Turco Redi-Paint, shows the typical dark color and the paint adhering firmly to the treated area.

a tight bond with the paint. It also neutralizes the alkalinity and passivates the metal instantly, forming an inactive film which will not become alkaline and which is resistant to corrosion.

Turco Redi-Paint can be applied by hand or by tank immersion. When applied by hand, the Redi-Paint is simply wiped on full strength, or diluted with water, with a sponge or rag. When the proper color develops—which is a matter of a few seconds—the surplus liquid is squeegeed off and wiped with clean, dry cloths.

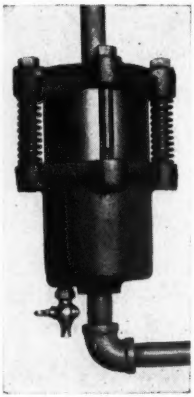
The dull, dark color, typical of the Redi-Paint prepared surface, is proof of the passivated galvanizing which insures permanent paint adhesion, thereby increasing the usefulness of the galvanized treatment now widespread for drainpipes, cornice work, refrigerator cabinets, and many military applications.

Nankervis Anodizing Racks

George L. Nankervis Co., 5408 Commonwealth Ave., Detroit, Mich., has developed a line of standard racks and fixtures for use in the anodizing of aluminum parts such as sheets, skins, tubings, castings, bar stock and a variety of small items. The racks are said to eliminate the old, slow process of wiring, thus increasing production rates.

One of the major advantages obtained

AVOID WASTE and SPEED UP PRODUCTION



UNIVERSAL AIR FILTERS—for compressed air lines—have proved their superiority over the years in the removal of condensed moisture, oil and other impurities. Using a synthetic porous stone as the filter medium (in addition to the well-known principle of centrifugal action), this filter delivers pure, dry air for process use by the leading Industrials of the U. S. A.

Maintenance is simple and easy. Two filter stones are furnished with each unit to assure continued operation during simple cleaning process.

Detailed information will be gladly supplied on request.

UNIVERSAL FILTER CO.

Manufacturers

7025 MANCHESTER AVE. **ST. LOUIS, MO.**

MAAS & WALDSTEIN

Announces

VICTORY WRINKLE FINISHES

—*Without CHINAWOOD OIL*

★ ★ ★

Because of a shortage of Chinawood oil the use of standard wrinkle finishes has been prohibited by the Government, except for a few special applications.

M&W research has developed a complete line of wrinkle finishes that contain no Chinawood oil but closely resemble our standard Duart wrinkle finishes in all other respects.

They form hard, durable coatings; they cover rough metal surfaces effectively in a single coat; they are applied in regular wrinkle patterns by the same methods; and they are supplied in a full range of colors.

Send for full information.

M&W

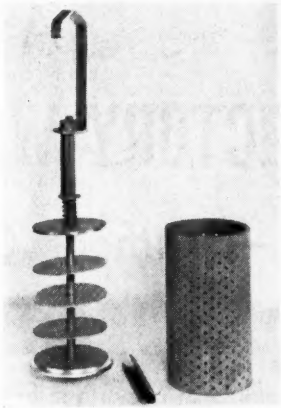
MAAS & WALDSTEIN COMPANY, NEWARK, N. J.

PRODUCERS OF LACQUERS, ENAMELS, SYNTHETICS AND SPECIALTY FINISHES FOR ALL PURPOSES

Branch Offices & Warehouses: 1658 Carroll Ave., Chicago, Ill. • 1228 W. Pico Blvd., Los Angeles, Calif.

through the use of the racks is the saving of man hours; work may be racked quickly and securely by inexperienced labor. Other features include the saving of wire cost inasmuch as the racks may be used over and over with little if any depreciation. The racks are said to be thoroughly insulated with a specially developed material, so that no electrical energy is diverted from the work, nor is acid consumed in anodizing the rack.

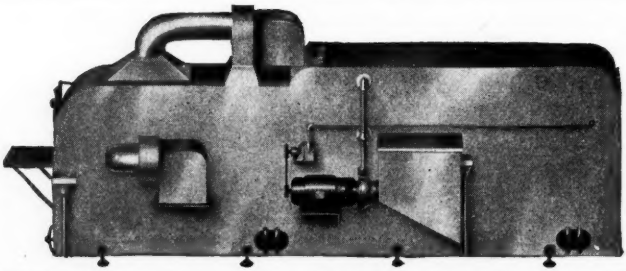
For those whose requirements cannot be filled by the standard racks, the manufacturer offers an engineering and design service where special fixtures will be developed to fill special needs. Sample parts or blueprints of parts should be furnished, along with dimension



Shown here is a Nankervis fixture designed for small parts which are suitable for bulk anodizing.

sketches of the anodizing tank, showing worwable area of tank and the distance

IN STRIPPING COPPER
McKeon's
"Liquid Sulphur"
STEPS UP PRODUCTION
Sample FREE
SULPHUR PRODUCTS CO.
GREENSBURG • PA.



STURDY-BILT *Soaker-Hydro* METAL PARTS CLEANER

A production unit for the positive removal of dirt, chips, oils, greases, etc. Hot "SOAKING-PROCESS" combined with powerful washing action. Equipped with a built-in positive Drying Unit and Chamber. Parts are delivered properly dried and ready for the next operation.

Write for complete information

STURDY-BILT EQUIPMENT CORP., **Dept. P8, West Allis, Wisconsin**

Also manufacturers of "SIMPLEX" all-purpose metal parts cleaners.

Quality

Important at all times,

Vital in War

Quality is an essential ingredient of every Randolph product you buy.

It is also the keynote of the entire Randolph organization. Graduate Chemists represent a big percentage of our staff. Each of our foremen has learned the art through at least 15 years practical experience. Our ownership and management is exclusively by Chemists and Chemical Engineers.

Such an organization assures you of an accurate scientific formula for each item, together with the highest degree of uniform production.

We invite you to submit your urgent finishing problems by mail or wire.

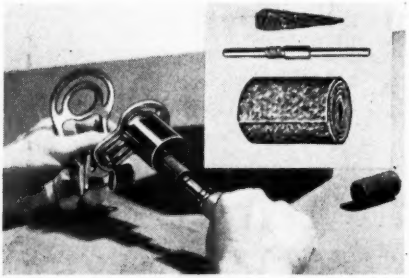
RANDOLPH
FINISHING PRODUCTS CO.

Carlstadt **New Jersey**

from the top of the bus bar to solution level.

Flex-Abrasive Wheels and Micro-Points

A line of abrasive wheels and points with construction features that place a fresh abrasive surface constantly in contact with the work and allow full use of the spiral roll, down to its final layers, has been announced by The Flex-Abrasive Company, 100 N. LaSalle St., Chicago, Ill. The sharp, cool and smooth-running abrasive wheels and micro-points are said to deburr easily exterior edges and finish irregular surfaces, ordinarily hard to reach, such as holes, openings and corners. They are made in many different types and sizes for use on hard alloy steels, wood, rubber, resin and plastics.

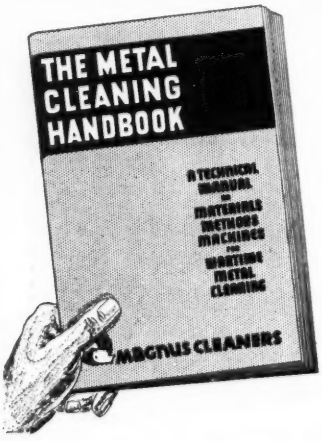


Flex-Abrasive Wheels and Micro-Points

The mandrels are of tapered thread construction which firmly locks the abrasive wheel or point to the shaft by its rotary motion. An inexperienced operator can instantly remove or replace a wheel or point from the mandrel without the use of tools, nuts, split shafts or grommets.

Mystik "Self-Stik" Cloth Tape

A waterproof, non-rubber, pressure-sensitive cloth tape has been developed by Mystik Tape Division, Chicago Show Printing Company, 2635 N. Kildare Ave., Chicago, Ill. The tape provides protection against water, salt spray, and other destructive elements and has also been found useful in many phases of manufacturing where there is need for pro-


THE METAL CLEANING HANDBOOK
A TECHNICAL MANUAL ON MATERIALS METHODS MACHINES FOR MAINTAINING METAL CLEANING
MAGNUS CLEANERS

YOUR COMPLETE MANUAL on Metal Cleaning and Finishing!

Here is the complete manual on methods, materials and machines for metal preparation, protection and finishing.

Full of practical and immediately applicable ideas that will speed production, cut costs and improve quality of results in precleaning, washing, rustproofing, pickling, degreasing, burnishing, plating, painting, drying, cooling and similar operations.

WRITE FOR YOUR FREE COPY NOW!

MAGNUS CHEMICAL COMPANY

208 South Avenue **Garwood, N. J.**

Service Representatives in principal cities

magnus CLEANERS-METHODS-MACHINES

THE EXECUTIVE WHO STOPS TO THINK . . .

Knows that "10% for War Bonds isn't enough these days"

Workers' Living Costs going up . . . and Income and Victory Tax now deducted at source for thousands of workers . . .

Check! You're perfectly right . . . but all these burdens are more than balanced by *much higher* FAMILY INCOMES *for most of your workers!*

Millions of new workers have entered the picture. Millions of women who never worked before. Millions of others who never began to earn what they are getting today!

A 10% Pay-Roll Allotment for War Bonds from the wages of the family bread-winner is one thing—*a 10% Pay-Roll Allotment from each of several workers in the same family is quite another matter!* Why, in many such cases, it could well be jacked up to 30%—50% or even more of the family's *new* money!

That's why the Treasury Department now urges you to revise your War Bond *thinking*—and your War Bond *selling*—on the basis of *family* incomes. The current War Bond campaign is built around the family unit—and labor-management sales programs should be revised accordingly. For details get in touch with your local War Savings Staff which will supply you with all necessary material for the proper presentation of the new plan.

Last year's bonds got us started—*this year's bonds are to win!* So let's all raise our sights, and get going. If we all pull together, we'll put it over with a bang!

This space is a contribution to America's all-out war effort by
PRODUCTS FINISHING

you've done your bit . . . now do your best!

★ ★ ★ ★ ★ ★ ★ ★ ★

#2006

SPECIFICATIONS!

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PLUS

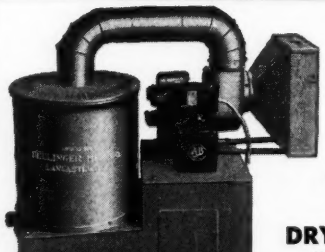
Adaptation of formulae to the individual requirements of busy war contractors.

Within specification limits there are many possibilities of improvement in speed, workability, and freedom from rejects.

This PLUS factor is worth considering. We'd like to tell you more about it.

The Varnish Products Co.

Cleveland, Ohio



STEP UP DRYING SPEED AND QUALITY

The Kreider Centrifugal Dryer cuts drying time, improves quality of plated work. All steel, electric welded construction. Economical ¾ H.P. motor. V-belt drive. Fast-acting foot brake and reversing drum switch. Anti-friction bearings. *Auxiliary heating unit available.*

Write or wire for complete information and prices.

DELLINGER MFG. CO., 729 N. Prince St., Lancaster, Pa.

KREIDER *Centrifugal Dryer*

tective shielding and adhesion-holding in a time-saving, easily workable form.

The tape is said to be both pliable and tough; it is non-ravelling and can be stripped off and correctly relocated without loss of adhesion. It is furnished in standard olive green; other colors are available on special quantity requirements. The tape is available in all widths up to 36 in. Maximum tolerance, $\frac{1}{64}$ in. The standard thickness is 0.004 in., but is available on special orders from 0.002 to 0.008 in. It is claimed that the adhesion is not impaired by stripping off the tape immediately after application. Also, should the adhesive become attached to itself, the tape can be easily separated, without damage, by merely pulling it apart.

Addenda Listings to the "National Paint Dictionary"

Due to present conditions, it will be several years before another edition of the "National Paint Dictionary" is published. In order to aid owners of the second edition of this book in keeping it up to date, the Stewart Research Laboratory, publishers of the dictionary, has prepared a supplementary listing known as Series 1 of the Addenda. A number of important terms are defined and discussed in detail. The listing brings the dictionary up to date as of July 1, 1943.

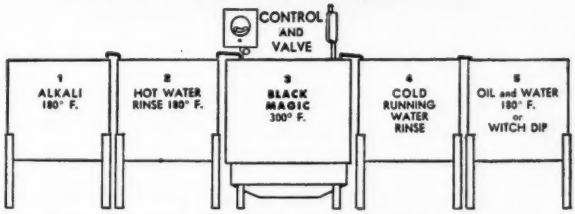
The cost of the supplementary service is $3.00 for the first series, which contains five publications. Address orders to the Stewart Research Laboratory, 1340 New York Ave., N. W., Washington, D. C.

The Metal Cleaning Handbook. The Magnus Chemical Company, Inc., has issued a 72-page illustrated manual entitled "The Metal Cleaning Handbook." The handbook provides an organized means of selecting cleaning materials, methods of use and types of washing equipment best adapted to efficient cleaning of various kinds and shapes of metal articles.

The first half of the manual is devoted to cleaning materials and the factors governing the selection of such compounds. Each four main classes of cleaning materials — solvent cleaners, petroleum spirit cleaners, alkaline cleaners and emulsifiable cleaners—is discussed separately. Under each are indicated the kinds of metals and articles each

BLACK-MAGIC
"the one bath process"

Accepted on Ordnance and other Government contracts calling for black oxide finish.


CONTROL AND VALVE
1 ALKALI 180° F.
2 HOT WATER RINSE 180° F.
3 BLACK MAGIC 300° F.
4 COLD RUNNING WATER RINSE
5 OIL and WATER 180° F. or WITCH DIP

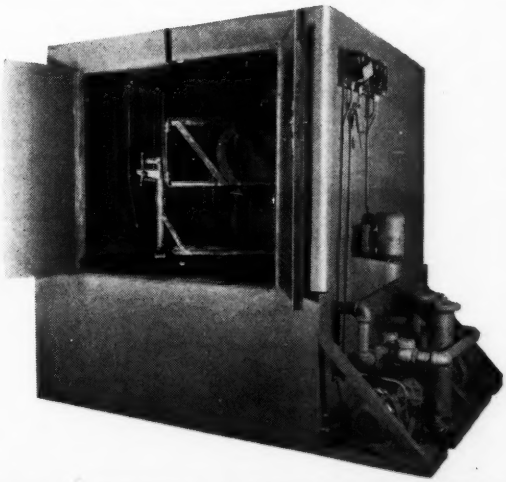
A SHORT CUT TO FAST PRODUCTION

"Used to take 4 days to blue a gun—BLACK-MAGIC does it in twenty minutes."
W.P.B. Order L-216 Schedule 3 accepts black oxide final finish for plier's and nippers.
BLACK-MAGIC plus WITCH-DIP is a substantial rust resistant finish for all tools and steel fabrications.
Other BLACK-MAGIC processes for Brass, Copper, Zinc diecastings, zinc sheet stampings, malleable iron.
SILCO: the new inorganic finish. Withstands salt spray for 200 hours or over. Supplied Black, White, Olive Drab, Navy Warm Drab.

Write for portfolio of complete information

MITCHELL-BRADFORD CHEMICAL CO., Bridgeport, Connecticut
Nationwide Engineering Service

Expedite
PRODUCTION FLOW
INSTALL HOWARD
Cleaning Equipment



HOWARD machines simplify and speed the most difficult cleaning operations. This machine, for instance, quickly and thoroughly cleans a complicated aircraft engine. Base of the machine is sunk in the floor to save space—and manpower—to facilitate loading of engine off the production line.

Write for solution of your metal cleaning and finishing problems. CATALOG on request.

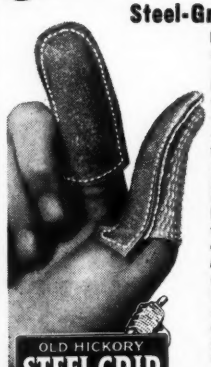
HOWARD ENGINEERING & MFG. CO.
1056 Hulbert Cincinnati 14, Ohio
Metal Cleaning and Finishing Machinery

NALCO DRITHERM
CARBON FILAMENT LAMPS
Best For Infra-Red Ray Drying

Nalco Dritherm Lamps are the carbon filament type...proved for years in therapeutic and industrial practice as providing maximum manation of infra-red ray within the desirable penetration band. Made only by—
NORTH AMERICAN ELECTRIC LAMP CO.
1020 Tyler Street St. Louis, Mo.

SOL-KLEAN
for
Better Paint
Adhesion
INDUSTRIAL CHEMICAL PRODUCTS CO.
DETROIT 7
Milwaukee Fort Wayne

Save Fingers
with
Steel-Grip Finger Guards



Hundreds of factories are saving time and injuries in war production by protecting workers with Steel-Grip Finger Guards. Used for handling rough or sharp articles, for buffing, grinding, sanding, polishing, punch press work and hundreds of other jobs. Protect fingers or thumb, front or back, from cuts, abrasions or blisters. Made of durable leather with elastic web back for snug, cool, comfortable fit. Easy on and off. One size fits all, men or women. Send 10c each for samples or trial order box of 50 at 8½c each, less 10%. *Catalog of Steel-Grip Safety Apparel free on request.*

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class is best suited for, its major uses and its disadvantages.

In the section on alkaline cleaners are discussed the following operations: cleaning after drawing and stamping; cleaning die cast parts; cleaning after salt bath annealing; cleaning after slushing oils and rust preventives; cleaning after buffing and polishing, and cleaning for a chemically clean surface. The second section of the manual is a very complete treatise on modern metal washing machines. It discusses all types, from simple dip tanks to fully automatic, continuous conveyor machines for washing, rinsing, drying, cooling and pickling operations. The machines are also pictured in blueprint form.

The balance of the manual discusses related metal processing operations such as drawing, lubricating, burnishing and anti-rusting. Copies of the Magnus "Metal Cleaning Handbook" can be obtained by writing the Magnus Chemical Company, Inc., 208 South Ave., Garwood, New Jersey.

Ferro "Victory" Finishing and Colors. A line of finishes and colors developed to save time, critical materials and money in the finishing of wartime products has been announced by Ferro Enamel Corporation, Cleveland, Ohio. The new developments in porcelain enamels include ground coats, cover coats, and brown ground coats. Also described are Ferro Victory colors; Chemroc, a coating for cast iron and sheet steel which is not a paint or enamel; Hi-Chemroc, a coating similar to Chemroc except that it burns at enamel temperatures, and Vedoc, a synthetic enamel which is said to be both versatile and durable.

MANUFACTURERS' REPRESENTATIVES

High grade manufacturers' agent representation desired in several open territories for the sale of "BLAXITE" black oxidizing salts to manufacturers of steel products. These continuing tonnage items should give a substantial income to men possessing the right trade contacts.

The Tobler Chemical Co.
Portland, Connecticut